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d'inspection des aliments

Animal Biosecurity

The National Sheep Producer Biosecurity Planning Guide



Growing Forward 
A federal-provincial-territorial initiative


FCM-CSF
Fédération Canadienne du Mouton
Canadian Sheep Federation

Canada

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1: Introduction

The National Sheep Producer Biosecurity Planning Guide (the Guide) is a tool for use by *sheep* producers in Canada when you are developing biosecurity plans for your farms. It has been prepared together with the National Sheep On-Farm Biosecurity Standard (the Standard), which contains an explanation of the common approach recommended to sheep producers for implementing biosecurity in the Canadian industry.

The Guide is not meant to be read as a book. Rather, it contains materials and information that you can work with in sections, and as you have time available. It provides an approach to preparing and documenting a biosecurity plan. Some producers will use the Guide to put together their first biosecurity plan; others will use it to test, update and/or modify their current plans.

The Standard and the Guide are intended to work together with your own animal records and on-farm flock health plans, and with the Canadian Sheep Federation's Food Safe Farm Practices Program, animal welfare programs and regulations, industry disease management programs, environmental farm plans, and traceability initiatives that you may already follow. In fact, some of the content in the Standard and the Guide may be duplicated in these programs and initiatives. This has been done to ensure that they are all complete, as stand-alone resources.

1.1 What is Biosecurity and Why is it Important?

Farm-level biosecurity is about a series of management practices designed to minimize, prevent or control:

- a) The introduction of infectious *pathogens* onto a farm;
- b) Spread within a farm production operation;
- c) Export of these pathogens beyond the farm, which may have an adverse effect on the economy, the environment and human health.

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Biosecurity *practices* work together with flock health and disease management programs to reduce the risk of disease transmission and to manage the impact of diseases in sheep flocks. In the National Sheep Producer Biosecurity Planning Guide ("The Guide"), biosecurity is a proactive component – working to reduce the risk of diseases entering the farm, being transmitted between sheep in the flock and being spread to other farms.

Biosecurity reduces the risk of endemic, economically-significant, production-limiting diseases. Such diseases may be present in many sheep flocks. Clearly, not all *endemic diseases* are present in every flock, and producers, when developing a biosecurity plan, need to determine which diseases are present or may be potentially at risk to target them in their plans. These target diseases are referred to in the Guide as each farm's **diseases of concern**.

Biosecurity practices also reduce the risk of transmission of *foreign animal diseases* (FAD) and newly-emerging diseases. They do so by addressing many of the common modes of transmission and by essentially reducing the survival and transmission of these pathogens.

Biosecurity practices are also important in reducing the risk to producers, their families and their workers of exposure to *zoonotic diseases*. Zoonotic diseases can be transmitted from sheep to humans, some, like Q fever, with very serious consequences, and from humans to sheep.

Biosecurity helps to reduce the risk of diseases reaching a flock and being transmitted within it. In doing so, biosecurity practices reduce suffering and in some cases mortality, and provide a foundation for improved production.

From this point forward in the Guide, materials will be presented that will help producers develop or improve their farm's biosecurity plan. In several sections additional spaces are included so that producers can enter information about their own flocks, their specific concerns and some analysis of their current practices.

1.2 Biosecurity Objectives for Sheep Producers

- Increased awareness and education about disease risk specific to sheep, including foreign animal diseases (FAD), production-limiting diseases and new and emerging diseases.
- Increased knowledge about disease prevention, management, and control and using it to develop a farm-specific flock health plan.
- Increased productivity per unit; a healthier national flock with lower death loss, better feed conversion and gain, and reduced disease.
- Consistent practice of biosecurity standards across Canada; producers, employees, veterinarians, service providers, public agencies, visitors, and their tools, equipment and vehicles present a reduced risk of transmitting diseases between and on farms.
- Decreased risk of the transmission of zoonotic diseases.
- Awareness that different levels of biosecurity and different biosecurity practices apply to different activities, both on the farm and off; including attendance at livestock exhibits and shows; and that farm gate sales will continue to be undertaken.

1.3 Top Ten Biosecurity Risks for Sheep Farms

Ten common risks were identified for sheep farms in Canada and are listed in the table below. You are encouraged to think about each of them in the context of your diseases of concern, your farm production practices, and your farm layout and facilities. Then, decide whether each is of Low, Moderate or High importance on your farm. Enter the L-M-H designation in the column to the right, with a brief note of explanation, if required. At the bottom of the table, insert any other biosecurity risks that you consider important on your farm.

<i>Top Ten Biosecurity Risks for Sheep Farms</i>	
Description of Risk	Importance on Your Farm: Low, Moderate, High and Comments
1) Unknown disease risk in sourcing new or replacement stock.	
2) Sheep leaving the farm, having direct or indirect contact with other animals and returning to the home flock.	
3) Risk of disease transmission in movement and disposal of <i>deadstock</i> .	
4) Risk of transmission of disease within your flock; management of diseased animals.	
5) Access to your flock by people from off-farm (service providers, farm workers and visitors) and risk of transmission of diseases through them from other <i>locations</i> .	
6) Animal flow through your facility and risk of disease transmission between animal groups within your farm.	
7) Risk of disease transmission within your flock from manure in your facilities and in storage on your farm.	
8) Farm facilities, and equipment, tools and vehicles used on your farm that may be contaminated with pathogens.	

9) Disease awareness among farm workers and their ability to identify potentially at-risk animals.	
10) Risk of disease transmission from <i>other livestock, working animals, wildlife, vermin, dogs and cats.</i>	
<i>Additional Risks On My Farm:</i>	

These "top ten" risks for the industry have been identified during the development of the Guide. Keep them and any additional risks that you have entered above in mind as you proceed to develop a detailed plan for your farm in the following sections.



2: Developing your Biosecurity Plan

Securing a farm is about knowing the risks of disease transmission and the ways in which animals can be exposed to disease, and taking steps to minimize those risks. Prevention through biosecurity is the most cost-effective protection from animal diseases. Building or updating your biosecurity plan will involve reviewing your current practices, farm layout and facilities to identify where gaps in your disease prevention might occur in order to adopt practices that will reduce those risks.

The information provided in the following sections is broken down into 4 main categories, referred to as Principles:

- 1) **Animal Health Management Practices** – activities that are directly related to your sheep and how they are handled, including health practices.
- 2) **Record Keeping** – information that needs to be recorded, reviewed and used so that your biosecurity plan can be integrated into your farm management practices.
- 3) **Farm, Facilities and Equipment** – activities that are directly related to your farm layout, buildings, pens and storage areas, and the tools and equipment you use on farm.
- 4) **People** – activities that are directly related to your family, farm workers, service providers and visitors of all kinds.

You will find that these Principles are used to categorize the practices and resource materials throughout the Guide, and will be used to help you work your way through the preparation of a plan.

In Section 2.3 of the Guide you will find a set of checklists, one for each Principle that you can use to assess your current biosecurity practices and identify any gaps you might have. The Guide also contains resource materials that will help you make decisions about what to include in your plan and how to carry it out.

When you are ready to review your current biosecurity plan, or to begin developing a plan for your *sheep operation*, use the following steps:

- 1) Choose a Principle
- 2) Fill out the self-assessment checklist for that Principle
- 3) If any topics or practices are new to you or if you need information, refer to the section(s) identified in the checklist
- 4) Identify possible gaps in your biosecurity practices
- 5) Develop a biosecurity plan for that Principle by preparing protocols for each of the “risk management practices” you select for your plan. Risk management practices are listed for each Principle in Sections 3 to 6.

As a plan section is prepared for each Principle, repeat the cycle until all four Principles have been reviewed and a full plan is prepared.

Producers who have an ongoing relationship with a flock veterinarian are encouraged to work together with him/her in developing a biosecurity plan. Additionally, other specialists and advisers may be useful; a list of such resources is provided in Appendix 2.

2.1 Diseases of Concern

The first step in preparing a biosecurity plan is to identify and understand the diseases of concern for your farm. Knowing and understanding the diseases of concern for your farm and assessing where the risks of disease transmission are likely to be will help you decide which biosecurity practices to include in your plan and determine the results you should expect.

When identifying diseases of concern for your farm, it will help to become familiar with the diseases that are prevalent in the sheep industry in Canada and in your region.

Diseases that might be a concern on sheep farms in Canada are included in the following table. Enter in the column to the right whether each is of Low, Moderate or High importance on your farm. The table is not intended to list all diseases of sheep; rather it includes those that could have a sizable impact on a sheep farm, and those that could occur in Canada. You are encouraged to read through the list and learn about any you may not be familiar with. Then you can indicate your level of concern about managing the disease or keeping it off your farm in the column on the right side of the chart. Also, there is room at the bottom of the chart for you to add diseases that are not listed in the chart and that you are concerned about. These entries will be useful as you consider adding risk management practices to your biosecurity plan that are targeted on the diseases of concern for your operation.

Disease Category / Name	Zoonotic Yes (Y) / No (N)	Other Susceptible Species	Sources of infection to sheep	Your need to exclude /manage (L-M-H)
Infectious Causes of Abortion				
<i>Campylobacter jejuni</i> & <i>C. fetus fetus</i>	Y	Birds	Manure, feces, birth products, carrion birds, contaminated lambing grounds. Shed in feces of carrier ewes.	
<i>Chlamydophila abortus</i> (formerly <i>Chlamydia psittaci</i>)	Y	Goats, llamas, alpacas	Birth products; contaminated pasture, bedding; sexual transmission from ram; carrier ewes. Invades through mucous membranes (mouth, eyes, genital) and causes abortion at next pregnancy.	

<i>Coxiella burnetii</i> (Q fever)	Y	All animals; goats, cattle, cats, dogs	Birth products and fluids and feces; can be spread as an aerosol either from lambing ewes or dried bedding / manure. Also shed in milk.	
<i>Toxoplasma gondii</i> (Toxoplasmosis)	Y	Goats	Oocysts (eggs) shed in the feces of cats (usually kittens) from eating infected mice or sheep placenta. Cat feces contaminate feed (grain, forage) and pasture. Mice serve as a reservoir of infection for the cats. Mice eat infected placenta.	
Border Disease (Hairy Shakers)	N	Cattle, goats	The virus is very similar to Bovine Virus Diarrhoea virus (BVDV). Persistently infected (PI) sheep or cattle shed the virus in feces, urine, and saliva contaminating the environment and infect naïve pregnant ewes causing abortion or birth of PI lambs.	
Infectious Diseases of Young Lambs				
Neonatal diarrhea (<i>rota/ coronavirus, enteropathogenic E coli</i>)	N	Kids, calves, crias	Shed in feces of sheep but build up in environment until the infectious load in lamb rearing area is high enough to cause significant disease in lambs < 2 weeks of age.	
Neonatal diarrhea caused by <i>Cryptosporidia</i>	Y	Kids, calves, crias	The oocysts (eggs) of this protozoal parasite are shed in the feces and contaminate the lambing, and lamb rearing environment. If a sufficient load, cause disease in lambs 2 days to 6 weeks of age. The oocysts are very long-lived.	
Pulpy Kidney / Enterotoxemia (<i>Clostridium perfringens type D</i>)	N	Goats	The bacterial spores are shed in feces and contaminate the ground and feed. If the animal lacks immunity and the feed source is rich (lush pasture, heavy grain), the ingested spores will grow in the gut producing a toxin which rapidly kills the lamb (sudden death in otherwise healthy lambs). The spores are very long-lived.	
Coccidiosis (<i>Eimeria ovinoidalis, Eimeria crandallii</i>)	N	None	The oocysts (eggs) shed in the feces of infected lambs and recovered adults will build up in the environment (barn, drylot, pasture) until load is high enough to cause disease in lambs 3 weeks to 6 months of age. Fecal contamination of feed is associated with more severe levels of disease. The oocysts are very long-lived.	

Pneumonia	N	Goats	These bacteria normally inhabit the throat of healthy sheep (<i>Mannheimia haemolytica</i> , <i>Mycoplasma ovipneumonia</i>). Environmental stresses (crowding, ammonia from wet bedding, temperature fluctuations, humidity, mixing of groups, etc), will allow severe disease to occur.	
Orf / Soremouth / Contagious Ecthyma (parapox virus)	Y	Goats, llamas, alpacas	The virus lives in scabs which drop off and contaminate the pens, feeders, wool. The virus can live for months to years in a dry environment. Some animals remain chronically infected (e.g. polls of rams) and serve as reservoirs of infection.	
Salmonellosis	Y	All animals	Rodent and bird feces contaminate feed. Diarrhea from infected animals contaminate environment.	
Gastrointestinal nematode (GIN) parasites	N	Goats, llamas, alpacas	(<i>Haemonchus</i> , <i>Teladorsagia</i> , <i>Trichostrongylus</i> , <i>Nematodirus</i>). Eggs passed in feces of infected animals contaminate grazing pastures. Introduced animals can bring in new infections and anthelmintic resistant parasites.	
Anthelmintic resistant (AR) GIN parasites	N	Goats, llamas, alpacas	Failure to kill GIN parasites after deworming due to the parasite's resistance to that dewormer is an emerging problem. Inappropriate deworming practices can cause this resistance. AR tends to develop more rapidly in goats making their presence a particular risk. New introductions are also a risk for bringing AR parasites onto a farm.	
Chronic Wasting Diseases of Adult Sheep (Thin Ewe Syndrome)				
Johne's disease (paratuberculosis) (<i>Mycobacterium avium paratuberculosis</i>)	Unknown	Goats, cattle, deer, llamas, alpacas	Bacteria shed in feces, colostrum, and milk infect lambs when ingested. Bacteria are long-lived and contaminate the environment, including the teats of nursing ewes. Shedding animals may not have symptoms of disease for several years. Also is transmitted from dam to the lamb while in the womb.	
Scrapie	N	Goats	Infected ewes will shed in birth fluids and placenta at lambing if offspring is genetically susceptible. The prions contaminate the lambing grounds and infect other susceptible lambs and sheep. Also shed in milk and urine. Prions are very persistent in the environment.	

Caseous lymphadenitis; CL; CLA (<i>Corynebacterium pseudotuberculosis</i>)	N	Goats, llamas, alpacas	The bacteria from abscesses can survive for days (water), weeks (feed) to months (soil, feeders, shearing equipment). It invades through skin, and cuts in the oral cavity. The bacteria come from broken abscesses and from the lungs when abscess material is coughed up - contaminating pasture and feed.	
Maedi visna (Ovine Progressive Pneumonia)	N	Goats	The virus is shed in respiratory secretions which can be aerosolized, and in colostrum, and milk. The virus infects sheep of any age through the mucous membranes (respiratory tract, digestive tract, conjunctiva, semen and in the womb).	
Lameness Caused by Infectious Organisms				
Foot scald	N	Goats	The bacteria (<i>Fusobacterium necrophorum</i>) are ubiquitous in the environment. Dirty, wet, traumatic conditions (wet, muddy pasture, yards or pens) will cause invasion of the soft tissues between the toes with this bacteria.	
Footrot	N	Goats	The bacteria (<i>Dichelobacter nodosus</i>) cannot live off the sheep's foot for more than a week but infected sheep contaminate pastures. Grazing sheep become infected when the bacteria are present and conditions are wet or dirty. Sheep can be carriers and may be lame or appear normal.	
Infectious Neurological Diseases				
Listeriosis (<i>Listeria monocytogenes</i>)	Y	Goats, cattle	Fecal-oral through silage and other feeds. The bacteria is shed in manure and found in rodents. It grows well in cool conditions in fecal contaminated wet feed at normal to high pH conditions. Also causes abortion and pink eye.	
Rabies	Y	All domestic mammals. Fox, skunks, bats	Usually wildlife contact - most commonly fox and skunks. Unvaccinated farm cats and dogs pose a particular risk because of close contact with livestock and humans.	

Tetanus (lockjaw)	Y	All animals	The spores can live for decades in the soil. An animal with a wound or kidding injury has the wound contaminated with spore containing soil. The bacteria grow in the wound and produce a toxin which is absorbed by the nerves.	
Deer meningeal worm (<i>Paralaphostrongylus tenuis</i>)	N	Goats, llamas, alpacas	A parasite whose host is the deer and which cycles through land snails and slugs. Sheep become infected by inadvertently eating the infected snails and slugs. The parasite invades the central nervous system causing disease.	
Infectious Diseases of the Skin and Eyes				
Pink eye (<i>Mycoplasma conjunctivae</i> & <i>Chlamydia pecorum</i>)	N	Goats, not cattle	Sheep can be carriers of the bacteria, shed then in the lacrimal secretions so that when groups are mixed or new animals are introduced, outbreaks occur.	
Chorioptic mange (<i>Chorioptes bovis</i>)	N	Goats, cattle, llamas, alpacas	Causes dermatitis usually on the pasterns and fetlocks but most importantly on the scrotum of rams – where the inflammation can cause sub-fertility. Transmission is by direct contact between animals and contaminated tools, equipment and bedding.	
Biting and Sucking Lice	N	None	Nits (eggs) and lice are transmitted by direct contact between animals, contaminated tools, shearing equipment and bedding.	
Keds	N	None	Ked eggs, pupae and adults are transmitted by direct contact between animals, contaminated tools, equipment and bedding.	
Ringworm (Club Lamb Fungus)	Y	Goats, cattle	The fungus prefers dark moist conditions and is easily transmitted by direct contact, grooming tools and equipment, shared pens at shows. The spores are very long-lived.	
Fly-Strike	Y	All animals	The green-bottle fly (<i>Lucilia sericata</i>) is attracted to decaying material and will lay its eggs on live animals that are wet or dirty. Animals with diarrhea, wounds, foot rot, long tails or wool are very susceptible to maggot infestation which causes illness and death. Poor management of deadstock may attract more flies.	

<i>Mastitis</i>				
<i>Staphylococcus</i> mastitis (<i>Staphylococcus aureus</i>)	Y	All animals	The bacteria are commonly present in skin infections (including people). Can be transmitted through milking, lambs nursing, teat wounds, dirty hands, poor udder preparation for milk, lack of teat dipping.	
<i>Other infectious diseases of concern on your farm:</i>				
<i>Cysticercus ovis</i> (sheep measles)	N	Goats	<i>C. ovis</i> is the intermediate stage of the dog tapeworm, <i>Taenia ovis</i> . The dog, or wild canid becomes infected from scavenging sheep carcasses or being fed uncooked sheep meat. The tapeworm eggs shed by the dog contaminate feed and pasture. The intermediate stage cysts are found in the meat of the sheep and cause carcass condemnation.	
<i>Fascioloides magna</i> (deer fluke)	N	Wild deer in Manitoba and NW Ontario	This fluke has its adult stage in deer, and its intermediate (larval) stage in snails. The larval are inadvertently grazed by sheep – not the parasite's normal host. The adult fluke is very large and migrates through the liver, damaging blood vessels and causing the sheep to bleed to death internally. No eggs are passed by the sheep in the manure.	

Some of the diseases listed in the chart are the subject of industry programs that may provide information and services to help with managing them. At the time of preparation of the Standard and the Guide, these include a national Voluntary Scrapie Flock Certification Program and a voluntary program to address maedi-visna in Ontario and Québec, Canadian Sheep and Lamb Food Safe Farm Practices Program and various flock health programs including the Western Canadian Flock Health Program in Saskatchewan and Alberta and the Ontario Sheep Health Program in Ontario. Contact your provincial sheep organization for these and other initiatives that may be underway or planned in your area.

2.2 Risk Assessment

Clearly identifying the risks specific to your sheep farm is a critical step in determining what biosecurity practices need to be included in the farm plan. Self-assessment checklists are provided in the following section, and can be used to ensure that all potential risks are considered on your farm.

In practice, identifying specific risks on your sheep farm combines the knowledge of how diseases of concern are transmitted from one animal to another or from fomites to sheep, and documenting all of the transmission points on your farm:

- Some diseases move by direct contact between animals, by physical contact and aerosol spread, and others are transmitted during breeding activities.
- Some move by contact with feces, urine or other excretions/secretions, and can be transmitted by direct contact with these substances, or by indirect contact with contaminated equipment and tools or consumption of contaminated feed, water, bedding or other shared material.

2.3 Self-Assessment Checklists

Checklists are provided below for each of the four biosecurity Principles, and each is followed by a chart for you to record your thoughts about any gaps or improvements that you might have discovered in filling out the checklist. To use a checklist, place a check mark or a brief comment in one of the boxes to the right of each statement, and when you have completed the chart, review your responses to identify areas that are being handled well under your current practices, or topics that might require additional attention. The "Section Reference" column identifies the sub-section of the Guide in which you will find information and resource material about each practice.

2.3.1 Animal Health Management Practices

Biosecurity practices for animal health management	Self-evaluation Checklist				Section References
	Always/frequently	Sometimes	Never	N/A	
	Yes	No			
The sheep needed to maintain and grow my flock are produced on my farm.					3.1.2
Artificial insemination is used to replace sheep and rams.					3.1.2
Embryo transfer is used to replace sheep and rams.					3.1.2
I purchase new sheep from a limited number of sources.					3.1.2
When I purchase new sheep, I know the health status of the individual animals and of the source flock.					3.1.2
My sheep purchases are supported by documentation on the health and disease status of the animals.					3.1.2; 3.2.1

When my sheep participate at a show or a fair, I take measures to reduce the risk of disease transmission from other sheep.					3.1.3; 3.3.2
When my sheep use common or community pastures I follow specific <i>biosecurity protocols</i> .					3.1.3
I avoid commingling my animals with animals from other farms during transportation.					3.1.2; 3.1.3; 3.1.5; 3.3.5
All newly-acquired sheep that are brought to my farm are isolated for a period of time determined by the specific diseases of concern for my farm.					3.1.1; 3.1.2; 3.3.1; 3.3.2; 3.3.3
All sheep that return to my farm (e.g. after going to a show, and loaned sheep or rams) are isolated for a period of time determined by the specific diseases of concern for my farm.					3.1.1; 3.1.3; 3.3.1; 3.3.2; 3.3.3; 3.3.6
I have an <i>isolation area</i> .					3.1.2; 3.1.3; 3.1.4; 3.3.1; 3.3.3; 3.3.6
Sheep in an isolation area are monitored daily for signs of illness.					3.1.1; 3.1.4; 3.3.1; 3.3.3
Sheep in an isolation area do not have direct contact or indirect contact (feed, water, shared equipment) with my main flock.					3.1.4; 3.3.1; 3.3.3
Sheep in an isolation area are enclosed and sheltered and do not share common airspace with my main flock.					3.1.4; 3.3.1; 3.3.3
The equipment used for treatment, handling and other husbandry chores in the isolation area is only used for that purpose.					3.1.4; 3.3.1; 3.3.4; 3.3.6; 3.3.8; 3.3.9; 3.3.10
When the equipment used for treatment, handling and other husbandry chores in the isolation area is used for the main flock, the equipment is cleaned and disinfected between uses.					3.1.4; 3.3.2; 3.3.3; 3.3.4; 3.3.6; 3.3.8; 3.3.9; 3.3.10
Dedicated clothing and footwear are used when working with sheep in the isolation area.					3.1.4; 3.3.1; 3.3.8
My employees work with the main flock before handling sheep in the isolation area(s).					3.1.4; 3.3.3

I have a protocol in effect for releasing sheep from isolation. (Note: such a protocol may include testing, vaccinating or treating for diseases of concern.)					3.1.1; 3.1.4; 3.1.7; 3.3.1
More susceptible animals in the flock are separated from older and/or diseased animals.					3.1.5; 3.3.3
Separation of animals by susceptibility applies to sheep movement through the farm, handling order, and worker contact with the animals.					3.1.6; 3.3.3
I use a flock health program to manage disease on my farm.					3.1.1; 3.2.3
My flock health program includes written protocols for disease control measures (e.g. vaccination, parasite control, disease testing, biosecurity) to be followed during specific production activities.					3.1.1; 3.1.7; 3.2.3
I use written treatment protocols for the management of sick animals.					3.1.1; 3.2.1
I follow written protocols for the use of all prescribed drugs, including withdrawal times.					3.1.1; 3.2.1
I routinely inspect and maintain my facilities to avoid pest and predator invasion.					3.1.8
Pest and insect management is in place.					3.1.8
I follow a protocol to prevent contact between wildlife and my sheep.					3.1.8
I follow a health plan for the dogs on the farm (working, guardian and pet) that includes vaccination against rabies and treatment for tapeworms.					3.1.8; 3.1.9
Female cats are spayed to reduce the risk of toxoplasmosis.					3.1.8

Based on the self-evaluation:

1. What animal health management gaps have I identified on my farm?

2. What steps can I take to correct these gaps?

2.3.2 Record Keeping

Biosecurity practices for record keeping	Self-evaluation Checklist				Section Reference
	Always/ frequently	Some- times	Never	N/A	
I maintain farm records for my sheep operation that include health records for each individual animal in the flock.					3.1.1; 3.2.1
My farm records include production records for each sheep including reasons for death or culling.					3.2.1
My farm records include production records for the flock overall.					3.2.1
My farm records include all disease occurrences and their treatment.					3.1.1; 3.2.1
My farm records include a record of prophylactic treatments (e.g. deworming) and vaccinations.					3.1.1; 3.2.1
My farm records include a record of mortalities, necropsies and any laboratory results.					3.1.1; 3.2.1; 3.3.10
Biosecurity training of farm workers is maintained in employee or farm records.					3.2.2
My farm records can be used to provide health and disease records for individual animals and for the flock to potential purchasers of live sheep.					3.2.1
I maintain an emergency response plan for use in case of a <i>disease outbreak</i> on the farm or in the area.					3.2.3; 3.3.1

Based on the self-evaluation:

1. What record keeping gaps have I identified on my farm?

2. What steps can I take to correct these gaps?

2.3.3 Farm, Facilities and Equipment

Biosecurity practices for farm, facilities and equipment	Self-evaluation Checklist				Reference
	Always/ frequently	Some- times	Never	N/A	
	Yes	No			
I have a map or diagram of my farm that shows facilities, working areas, pastures and pathways.					3.3.1
Biosecurity zones on my farm are identified.					3.3.1; 3.3.5
I use signs at access control points to describe my biosecurity protocols.					3.3.1; 3.3.5
I provide a dedicated parking area for farm workers and visitors that is separate from animal management and housing areas.					3.3.1; 3.3.5; 3.4.3
I have perimeter fencing around my sheep operation.					3.1.5; 3.3.1
My farm has specified practices for cleaning and disinfection.					3.3.2; 3.3.5
My farm workers are familiar with the cleaning and disinfection processes on my farm.					3.2.2; 3.3.2; 3.3.4; 3.3.5
Perimeter and interior fencing on my farm is inspected and maintained.					3.1.5;
Pens and other livestock areas on my farm are cleaned and disinfected when risk events (e.g. abortion outbreak) occur.					3.1.1; 3.3.2; 3.3.3
Specified risk areas on my farm (e.g. isolation areas for newly-introduced or sick sheep, etc.) are cleaned and disinfected after each use.					3.3.1; 3.3.2; 3.3.3
Barn facilities and pens on my farm are designed and laid out to facilitate good biosecurity practices.					3.3.1; 3.3.3
I provide dedicated equipment and tools for use in specific risk areas, such as the isolation area.					3.3.4; 3.3.6; 3.3.8

My equipment and tools are cleaned and disinfected between uses.					3.3.2; 3.3.4; 3.3.6; 3.3.8; 3.3.9; 3.3.10
Equipment and tools on my farm are identified for dedicated use (eg manure movement, feed handling).					3.3.3; 3.3.4; 3.3.6; 3.3.7; 3.3.8; 3.3.9; 3.3.10
Feeders and feeding areas are kept clean of manure, old feed and other contaminants.					3.3.2; 3.3.4; 3.3.7
Water bowls and water troughs are cleaned regularly.					3.3.2; 3.3.4; 3.3.7
Equipment used to move and handle deadstock is cleaned and disinfected immediately after each use.					3.3.2; 3.3.4; 3.3.10
Vehicles from my farm are used to transport sheep to and from the farm.					3.1.2; 3.1.3; 3.3.5
Livestock transportation vehicles are cleaned between uses.					3.1.2; 3.1.3; 3.3.2; 3.3.5
Sheep movement pathways on my farm are cleaned immediately following use by higher-risk sheep.					3.1.6; 3.3.1; 3.3.2; 3.3.3; 3.3.-
Manure is removed regularly and stored securely.					3.3.6
I keep samples of feed batches for testing and tracking purposes.					3.3.7
I store feed in a location that is secure from access by pests and animals.					3.3.1; 3.3.7
I provide quality water and test it at least annually for its safety for livestock.					3.3.7
Clean bedding is stored in a manner that keeps it free from contamination from animal products (e.g. feces).					3.3.7
Soiled bedding is removed regularly and disposed of away from the flock.					3.3.7
Shearing protocols are followed on my farm that include sequence, cleanliness and care of nicks and abrasions.					3.3.8

2.3.4 People

Biosecurity practices for people	Self-evaluation Checklist				Reference
	Always/ frequently	Some- times	Never	N/A	
My family members and farm workers understand what zoonotic diseases are and understand how to protect themselves against zoonotic disease risks.					3.2.2; 3.3.2; 3.4.4; 3.4.5
I hold regular biosecurity education sessions and on-the-job training with my farm workers.					3.2.2; 3.2.3; 3.3.1; 3.3.2; 3.3.3; 3.3.4; 3.3.5; 3.3.6; 3.3.7; 3.3.8; 3.3.9; 3.3.10; 3.4.4
All farm workers on my sheep farm understand the biosecurity practices that apply to their work.					3.2.3; 3.3.2; 3.3.4; 3.3.5; 3.3.6; 3.3.7; 3.3.8; 3.3.9; 3.3.10; 3.4.3; 3.4.4; 3.4.5
All farm workers on my sheep farm understand the biosecurity practices that apply to their work.					3.2.3; 3.3.2; 3.3.4; 3.3.5; 3.3.6; 3.3.7; 3.3.8; 3.3.9; 3.3.10; 3.4.3; 3.4.4; 3.4.5
I plan visits to my farm by service providers and visitors in advance.					3.3.1; 3.3.2; 3.3.5; 3.3.8; 3.4.1; 3.4.2; 3.4.3
I do a risk assessment when planning a visit by a service provider or visitor to my farm.					3.3.1; 3.3.5; 3.3.8; 3.4.1; 3.4.2; 3.4.3
Service providers and visitors know and understand the biosecurity practices that apply to their activities on my farm.					3.3.1; 3.3.2; 3.3.4; 3.3.5; 3.3.8; 3.3.10; 3.4.1; 3.4.2; 3.4.3; 3.4.4; 3.4.5



3: Risk Management Practices

3.1 Principle 1: Animal Health Management Practices

Goal – Minimize the health risk to your flock from sheep and other animals

3.1.1 Strategy 1 – Prepare and use a flock health program

A program that describes the flock health regimens and practices is used for day-to-day flock management. It is the basis for monitoring flock health and is a key source when considering flock performance. A biosecurity plan is integral to and supportive of the flock health program.

Producers should have a Flock Health Program that defines the health goals and practices for their flocks. A flock health program, developed with your flock veterinarian will be a key reference for the diseases of concern for each flock, a description of the vaccination regimen that is in use, and a source for any treatment guidelines. The flock health program will also guide producers in what health records need to be kept for individual animals and for the flock overall (see also Principle 2 – Record Keeping).

<i>A Flock Health Program should include:</i>
• Guidelines for flock health monitoring
• Staff training guidelines for recognition of diseases and use of the plan
• Documentation of diseases of concern for the farm
• Vaccination strategy for various age groups on the farm
• Vaccination and treatment strategies for animal additions
• Vaccination and treatment strategies for animal movements
• Disease monitoring/testing strategies
• Strategies for sheep under treatment
• Treatment protocols for diseases of concern on the farm

• Euthanasia protocol and guidelines for decision-making
• Meat and milk withholding times/strategies
• Proper storage and records for vaccines and drugs
• Appropriate disposal of empty and out-dated product containers
• An annual review of the plan

3.1.2 Strategy 2 – Sourcing sheep

Additions are limited and when necessary animals are sourced from suppliers with flocks of known health status. As few sources as possible are used. New stock is isolated upon arrival.

3.1.2.1 Description

Building a flock, replacing culled or lost sheep, and adding stock to improve the genetics of a flock may require purchasing sheep to be integrated into an existing flock. *Feedlots* that are regularly selling animals ready for slaughter routinely acquire new animals for feeding, often in large numbers. Currently, information about the health status of acquired animals is often informally provided or not available, and intermediaries, such as truckers and auction markets, often feature commingling, either when they are sourced for sale or in the selling location, that increase risks of disease transmission.

A written protocol for purchasing sheep and lambs, that takes into consideration diseases specific to the farm, will provide some guidance when evaluating these purchases. Different production categories will need different protocols; different considerations exist for breeding stock compared to other animals. Having a list of questions to ask that are specific and relevant to the sourcing route will also help determine risk.

3.1.2.2 Risks

1. Purchased sheep may have a disease(s) that will negatively impact their production and/or growth.
2. Purchased sheep may have or may be carrying a disease and transmit it directly or indirectly to your flock.
3. Purchased sheep may have been vaccinated or treated in a manner that is incompatible with your flock, and either the acquired sheep or your flock become infected.

3.1.2.3 Risk Management Practices

1. Minimizing purchases and raising more of your own new and replacement stock will reduce the risk directly. When using artificial insemination practices, work with known, accredited sources for semen and embryos.
2. Feedlot operators and other producers buying in lambs as feeders can develop sufficient regular sources and plan ahead rather than purchasing from uncertain sources and sources that feature

indiscriminate commingling. If this is not possible, test, treat and isolate; alternatively, manage the collected flock separately from others on the farm, using a modified *all-in-all-out* production system.

3. Plan ahead for additions, adding sheep infrequently, and allow advance planning by your chosen suppliers.
4. Limit the number of sources you buy from when sourcing new and replacement sheep.
5. Buy directly from replacement stock breeders; usually consisting of either maternal-trait animals (usually ewe lambs) and terminal sire-trait animals (usually rams), to ensure more consistent health information about the animals and the source flock and to limit the possibility of commingling.
6. Know the animal health practices of all your suppliers and their compatibility with the practices of your home farm.
7. Ask all lamb or sheep suppliers to provide health and disease records for all animals they supply and the flock(s) they have come from; a vendor declaration form that is presented when purchases are being considered would be very useful.
8. In all cases, ensure that source-flock health programs (specifically, their vaccination and disease status) are compatible with yours. Working with your flock veterinarian and, if possible, with the source-flock veterinarian will be useful in getting this right.
9. Additions should be of equal or higher disease-program status, e.g. participation in maedi visna or Scrapie programs.
10. Transport purchased animals yourself or use dedicated carriers whose biosecurity practices are known and are suited to your farm practices.
11. Prepare protocols for management of new stock on arrival for specific diseases; these might be specific to different types of stock (e.g. breeding stock and others).
12. In all cases, test, treat and isolate purchased animals upon arrival at your farm.
13. Adopt a specific isolation strategy for each source flock by making a list of undesirable diseases specific to the flock and adopt appropriate procedures for each (for example, the procedure is different for maedi visna versus foot rot). Note, however, that isolation will not be sufficient to fully prevent the introduction of some diseases, including Johne's disease and some causes of infectious abortion.

3.1.3 Strategy 3 – Manage sheep that leave and return to the home farm

If sheep are moved off the farm they have biosecurity practices consistent with their home farm practices, and upon their return they are treated as newly-sourced animals.

3.1.3.1 Description

Attendance at fairs and shows or loaning rams for breeding purposes are a normal part of the industry for many producers, both for social and business purposes.

Specifically, show performance may be related to success at selling breeding stock. However, this puts your sheep in environments in which biosecurity may not be consistent with or as rigorous as your practices. While your sheep are there, an off-farm location is much like a part of your farm, and your biosecurity practices ideally need to be replicated during the event. People attending the event often have access to and direct contact with the animals being shown, and the biosecurity of common

walkways and *adjacent* pens are often not known. Fairs and shows may have biosecurity protocols, but this is inconsistent and unregulated.

Loaning or borrowing rams for breeding purposes is a convenient way to balance production and improve genetics in a flock. Moving and transferring a ram from one farm to another sheep operation is generally in your control, and therefore can be managed carefully from a biosecurity point of view. While all common/endemic disease risks need to be addressed when sheep are commingled, specific sexually-transmitted diseases such as *Chlamydia* are also significant risks to both operations from loaning or borrowing rams.

3.1.3.2 Risks

3.1.3.2.1 Shows and Fairs

1. Sheep and/or other stock attending the event may have or may be carrying a disease and may transmit it directly or indirectly to your sheep. Examples of transmission risks by direct contact include nose-to-nose, aerosol contact, contact via manure, used bedding, common feeders and waterers, and equipment used at the event location.
2. Sheep and/or other stock attending the event may be transported in contaminated vehicles and may introduce pathogens onto the facility.
3. Event organizers, judges, etc. may transmit pathogens on their hands, clothing and/or footwear and come into close contact with your sheep.
4. People attending the event may transmit pathogens on their hands, clothing and/or footwear and come into close contact with your sheep.
5. Facilities and equipment at the event may not have been cleaned from previous uses and/or may not be cleaned and disinfected during the event.
6. Loading facilities at the show/fairground may be contaminated with manure and other excretions that contain pathogens.
7. The vehicle used to transport your sheep to and/or from the show/fair may not have been cleaned and disinfected before loading your sheep.
8. The vehicle used to transport your sheep may be carrying other sheep and livestock that infect your sheep.
9. The vehicle used to transport your sheep may not be cleaned and disinfected before arriving at your farm and may deposit contaminated material on your loading dock and/or other areas of the farm.
10. Returning sheep may be infected with a disease from contact at the event and transmit it to your flock.

3.1.3.2.2 Rams Loaned or Borrowed for Breeding

1. The flock to which the ram is loaned may have or may be carrying a disease and transmits it directly or indirectly to the ram.
2. The ewes in the flock to which the ram is loaned may have a sexually-transmitted disease and pass it directly to the ram.
3. The flock from which the ram is borrowed may have or may be carrying a disease and the ram transmits it directly or indirectly to the receiving flock.

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4. The borrowed ram may have a sexually-transmissible disease and may pass it directly to the bred ewes.
 5. Sheep or other animals at the borrower's farm may have been vaccinated or treated in a manner that is incompatible with the ram's home flock, and may directly or indirectly infect the ram.
 6. The vehicle used to transport the ram back to his home farm may not have been cleaned and disinfected before loading him, and may serve as a source of infection.
 7. The vehicle used to transport the ram is carrying other sheep and livestock which infect the ram and/or the home or receiving flock.
 8. The vehicle used to transport the ram may not be cleaned and disinfected before arriving at the home or destination farm and deposits contaminated material on its loading dock and/or other areas of the farm.
 9. The returning ram may be infected with a disease from contact at the borrowing farm and transmits it to the home flock.
 10. The returning ram may be contaminated with infective material and deposits it in the production area(s) of the home farm.

3.1.3.3 Risk Management Practices

3.1.3.3.1 General

1. If sheep are moved off the farm, they should be commingled only with sheep and other animals of similar/compatible health status.
2. If possible, appropriate biosecurity protocols should be in place anywhere sheep are taken.
3. Direct action can be taken, such as providing clean and own-use waterers and other equipment to the site, providing own-use feed, water and bedding, and cleaning and *disinfecting* pens and holding areas.
4. When they are returned to the farm, their re-entry should be managed consistent with Strategy 1 above.
5. Animals returning from any off-farm activities are transported either in your own vehicle or in a third-party carrier that has been cleaned and disinfected after the previous use.
6. When the returning sheep arrive at your farm, direct the transport vehicle to follow a predetermined route that avoids potential contamination.
7. Returning sheep should be placed in isolation for a period of time and should be tested, vaccinated and otherwise treated as determined by your diseases of concern. Note, however, that isolation will not be sufficient to fully mitigate the introduction of some diseases, including Johne's disease and some causes of infectious abortion.

3.1.3.3.2 Shows and Fairs

1. Learn about the biosecurity practices of any shows and fairs you are considering, and attend only those that are compatible with your practices. Encourage fair and show organizers to establish biosecurity programs and require all attendees to adhere to them.
2. Limit duration at shows and fairs without being late, which could lead to penalties.

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3. Bring your own feed, bedding (if possible), feeders, waterers and handling equipment to the event and use them exclusively.
 4. Limit personal contact of sheep; require those that must contact the sheep to wash and sanitize their hands and footwear before entering your pens and before handling your sheep.
 5. Transport your sheep to these events in your own vehicle or use dedicated carriers whose biosecurity practices are known and are suited to your farm practices.
 6. Test, treat and isolate your sheep upon their return to your farm, following the protocols developed as described in Section 3.1.4.

3.1.3.3 Rams Loaned or Borrowed for Breeding

1. Limit loaning or borrowing rams. Learn about the biosecurity practices of the farms you are considering and work only with those that are compatible with your flock biosecurity practices.
2. Compare vaccination and treatment regimens with the borrowing or loaning producer to ensure compatibility.
3. Transport rams to and from the borrowing farm in your own vehicle or use dedicated carriers whose biosecurity practices are known and are suited to your farm practices.
4. Isolate your ram upon its return, following the protocols developed as described in Section 3.1.4.

3.1.4 Strategy 4 – Isolate sick sheep, flock additions and returning sheep

Sheep showing signs of disease are moved into an *isolation* area away from the healthy flock until the disease has been resolved. Animals brought onto the farm are held in isolation until disease status has been determined or is resolved.

3.1.4.1 Description

Isolating sick sheep or sheep of unknown disease status is very effective in reducing the risk of disease transmission. Direct contact between animals, via aerosols for some diseases and via excretions can be avoided more easily when newly-arrived and returning sheep and sick sheep are isolated from the rest of the flock. An isolation area is available. It is a dedicated pen or enclosure that is separated from movement pathways and other pens and enclosures and ideally has a separate airspace. Ideally, access is also convenient for workers and veterinarians. Handling and management protocols that ensure isolation of the sheep should be followed by workers and others who need to enter the isolation area.

It is important to note that there are limits to the effectiveness of isolation for sheep and that isolation protocols need to be disease-specific. Some diseases of sheep will not display visible clinical signs during limited isolation and are not reliably diagnosed by testing. These include Johne's disease, several reproductively-spread diseases, and several abortion agents. Also, some animals can carry certain diseases without displaying clinical signs, but can still transmit them to other animals; again, the disease may not be revealed during a stay in isolation. For all these reasons, continued observation of isolated sheep is advised following their integration into the flock.

Sheep that are isolated in this manner can be observed and treated individually. Separate records can be kept, and when the isolated sheep are confirmed to be recovered from the disease they were suffering, or tested free of the diseases of concern, or when vaccination and/or treatment has taken effect, the isolated sheep are (re)integrated with the flock.

3.1.4.2 Risks

1. Animals that have been brought to the farm or brought back from a show or fair may transmit a disease to the home flock.
2. Diseased animals may transmit the disease they are suffering to their flock-mates.
3. Pathogens may be transmitted to the main flock on the hands, clothing and/or footwear of farm workers and others who are required to enter the isolation area(s).
4. Visitors may enter the isolation area(s) on purpose or by accident and subsequently transmit pathogens to the rest of the flock.
5. Excretions and secretions from diseased sheep and from sheep of unknown disease status in the isolation area may be spread to the main flock area(s) by equipment and tools or by *guardian animals*, dogs, cats and pests.
6. Delay in the removal of deadstock in the isolation area may provide the opportunity for them to be scavenged by guardian animals, dogs, cats and/or predators that may then transmit pathogens to the main flock.

3.1.4.3 Risk Management Practices

3.1.4.3.1 General

1. Establish areas that are dedicated to isolation, and consider different isolation areas for newly introduced / returning animals and sick animals. The same area could be used for both purposes only if it is cleaned and disinfected between uses. However, a sick animal and a newly introduced animal should not be isolated in the same area at the same time.
2. Isolation areas should have separate air space, and no shared alleyways, feeders, etc.
3. The isolation area(s) should be located away from pathways used to move other sheep and animals around the farm, using procedures described in Strategy 5. Separation from other animals on the farm should be provided, including guardian and working animals and dogs and cats. The isolation area(s) should be available to farm workers for both frequent observation and care.
4. The isolation area has a specific entrance and exit to avoid contamination of healthy sheep.
5. Access by anyone not directly involved in the isolated animals' care should be restricted.
6. The isolation area should be cleared of manure and bedding, and cleaned and disinfected before use by other sheep.
7. Feed and water used in the isolation area should be removed after each use, and waterers and feed bunks should be cleaned and disinfected (C&D) before use by other sheep, using appropriate materials and C&D methods (see Principle 3).
8. Tools and equipment used with diseased or unknown-status sheep should be kept apart from those used with the rest of the flock. Tools and equipment used in the isolation area should not be used in

other areas of the farm, or if they must be used elsewhere, they should be cleaned and disinfected before use, using appropriate materials and C&D methods.

9. Those working with isolated sheep should use biosecurity practices that are specifically designed for the isolation area.
10. Access by guardian animals, dogs, cats and pests should be limited so that they do not spread potentially-infective material elsewhere on the farm.

3.1.4.3.2 Isolating sick sheep

1. A list of the protocols you will need should be prepared. Here are some suggestions:
 - When to move sick animals to an isolation area (including what observations are required and what diseases are to be considered)
 - When a group / pen of sheep is sick, consider keeping that group in place and instituting isolation measures around the group to prevent disease transmission to healthy animals
 - Management of other sheep in the area(s) in which the sick animal has been found, and cleaning and disinfection of that area and of movement pathways
 - Testing/vaccinating/treating
 - Recording testing, vaccination and treatment information, and observations of the clinical signs
 - Determining the isolation period
 - Maintaining records of their health and condition during the period of isolation
 - Access protocols for workers – when to tend to the isolated sheep (both schedule and sequence); hygiene, clothing and footwear upon entry and exit; tools and equipment (including feeders and waterers)
 - Management of manure and bedding
 - Timely management of deadstock and culls
 - (Re)entry to the main flock (conditions for completion of isolation; method of introduction)
 - Avoiding anthelmintic/antimicrobial resistance
2. Biosecurity protocols that are designed to address the disease encountered and its treatment regimen, with respect to feed, water, bedding and manure management, and cleaning and disinfection should be used.
3. Treatment and all observations should be recorded consistently on a daily basis or more often as required by the severity of the condition being observed/treated.
4. Sheep should be (re)introduced to the main flock only when the risk of disease transmission has been managed. If a sheep did not survive, samples should be taken or a necropsy should be done.
5. If an animal tests positive for a disease, disposition of the animal should be decided: whether to manage or cull.

3.1.4.3.3 Introducing new stock

1. A list of the protocols you will need should be prepared. Here are some suggestions:
 - Handling new arrivals and returning sheep from the loading/unloading ramp to the isolation area(s)
 - Testing/vaccinating/treating new arrivals and returning sheep upon arrival

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- Recording information received about newly-acquired sheep, testing, vaccination and treatment information, and observations of their condition
 - Determining the isolation period
 - Maintaining records of their health and condition during the period of isolation
 - Access protocols for workers – when to tend the isolated sheep (schedule and sequence); hygiene, clothing and footwear upon entry and exit; tools and equipment (including feeders and waterers)
 - Management of manure and bedding
 - Management of deadstock and culls
 - (Re)entry to the main flock (conditions for completion of isolation; method of introduction)
2. New stock should be isolated for a period of time that allows for signs of diseases of concern to become evident, for shedding of pathogens to cease or for vaccination and/or treatment to take effect. The appropriate periods for diseases of concern can be discussed with your flock veterinarian.
 3. Newly (re)introduced sheep and/or commingled animals should be vaccinated, tested and/or treated with consideration for all diseases of concern on your farm.
 4. All isolated animals should be observed daily or more frequently as appropriate to the condition being observed/treated and all observations should be recorded and reviewed.

3.1.5 Strategy 5 – Manage contact with neighbouring/other livestock

Sheep in the home flock are housed, moved and pastured in such a manner that the risk of contact with neighbouring livestock or other livestock on the farm is addressed.

3.1.5.1 Description

Fenced areas can be designed and put to use to avoid direct contact between pastured sheep and other animals on the farm, and between your flock and animals on adjacent farms. However, most fencing systems will not eliminate contact with all wildlife.

Therefore, alternate strategies are needed to mitigate these risks that are inherent to pastured livestock. The following can be considered:

1. Pasture management on the farm: knowing what diseases are common risks among the livestock on a farm (i.e. diseases that can be spread among different livestock – e.g. cattle and sheep), and using both separated pasture areas and scheduling pasturing of sheep and other livestock in the areas to minimize contact;
2. A similar approach to pasture management between neighbouring farms: knowing what livestock is likely to be turned out in adjacent fields, knowing their disease status, and cooperating together in scheduling pasture use to avoid high-risk access between animals;
3. Use of guardian animals to defend the flock from wildlife that may be present;
4. Knowing the clinical signs of and, where possible, testing for diseases that could be spread to your sheep by wildlife.

3.1.5.2 Risks

1. You co-pasture your sheep and cattle. When you turn out a group of sheep onto the pasture after a breeding cycle, they could encounter a cow that you have not noticed is suffering from bovine viral diarrhoea (BVD), and one or more of the sheep could become infected.
2. Sheep and other livestock on your farm are housed in different areas of the same barn facility. Due to the layout of the barn, the pathways use by all species lead through some of the sheep pen areas, and pathogens may be transmitted to the sheep from manure deposited in the pathways.
3. Your farm has single fence lines around all of your pastures, and sheep are sometimes nose-to-nose with sheep or other livestock in the adjacent farm's pasture. Unbeknown to you, the sheep on the adjacent farm may have an infectious disease, to which your sheep are not immune, and it can be transmitted via direct or aerosol means to members of your flock. Other livestock with a disease to which sheep are also susceptible can represent the same potential risk.

3.1.5.3 Risk Management Practices

3.1.5.3.1 Other livestock on your farm: pastures and housing

1. Perform a risk assessment on the specific contact that you anticipate for animals on your farm including common pasture use, movement between farm areas, and housing in close proximity. Include consideration for susceptibility for common diseases among the species you are working with (e.g. Johne's disease, BVD, Border disease, Salmonellosis), and their specific cross-species risks. For example, commingling of sheep and cattle on pasture can be beneficial with respect to internal parasites, but mixing sheep and goats can be a major challenge for disease control (internal parasites, Johne's, caseous lymphadenitis).
2. A pasture schedule can be used to enable the outcomes of your risk assessment such that sheep and other livestock on your farm that represent a biosecurity risk to one another are not pastured in common or adjacent fields.
3. Pastures and facilities should be connected by pathways that allow movement to and between facilities and pastures with planned/limited interaction with other animals.
4. Sheep pastures and other production areas should be observed regularly to identify potentially-infectious material, and should be cleared as soon as it is identified.
5. Pasture areas and shelter/containment facilities for your other livestock should be designed and maintained in good condition to limit unintended commingling between sheep and other livestock in and around those facilities.
6. Internal fencing and pens can be installed and maintained so that you can keep sheep separate from other livestock on your farm.

3.1.5.3.2 Other farms and adjacent farms

1. Pasture management should be discussed with neighbouring producers who have sheep and/or other species with common disease susceptibility; a schedule for pastures can be agreed that avoids high-risk interaction between your flock and the neighbouring producer's livestock.
2. Fencing should be installed and maintained in good repair so that you can limit direct contact between your sheep and sheep or other livestock on adjacent farms.

3.1.6 Strategy 6 – Plan sheep movement through the production unit

Sheep are moved through and within the production unit by pathways that limit their exposure to diseased or potentially infectious animals and materials. Consideration should be given to health status, age and production stage.

3.1.6.1 Description

Sheep are moved regularly in the production unit. Dairy operations move *milking* ewes through the milking unit daily from their pens and back; movement to and from working pens and to and from pasture are less frequent but are similarly planned and managed. Movement to and from the isolation and lambing pens happens on a less frequent basis, but is important since it involves the movement of potentially diseased sheep and more susceptible lambs.

Using the farm maps/diagrams described in Section 3.3.1, decisions can be made about where sheep are potentially at risk when moving and where they represent risk to others; routes can be planned and practices can be put in place to reduce the risks identified. The map or farm diagram will identify where pathways between areas of the farm are used for sheep movement; the diagram of the barn and the main production area will help you identify where pathways run past areas of identified risks.

3.1.6.2 Risks

1. Diseased animals may transmit disease directly to sheep that are passing closely by their pens by direct contact or by aerosol means.
2. Susceptible sheep may be exposed to pathogens from feces or other excretions deposited in pathways by diseased or more resistant flock-mates.

3.1.6.3 Risk Management Practices

1. Using a map of the production area(s) as a guide, study and identify preferred pathways and routes by their relative risks for healthy animals.
2. Avoid routes and pathways that take healthy sheep past or adjacent to sick sheep.
3. Avoid routes and pathways that take sick sheep past or adjacent to healthy sheep, especially those that are more susceptible.
4. Plan movement in the following sequence: from young to older stock, from healthy to diseased and from more to less susceptible sheep, considering the diseases of concern for your farm.
5. Review movement plans with farm workers.

3.1.7 Strategy 7 – Implement sheep health protocols for specific situations

Protocols to limit risks of disease transmission are in place for specific production activities, and farm workers understand and employ them.

3.1.7.1 Description

Some of your regular flock management activities may expose them to risks of disease transmission. These activities include lambing, abortion management, milking, disease testing, vaccination and

parasite control. By their nature some require grouping of sheep in close quarters, some expose individual sheep to specific disease risk; some involve two or more sheep at different stages of development and therefore of different levels of susceptibility; and some produce by-products that themselves present disease risks.

3.1.7.2 Risks

1. Pathogens present in pregnant ewes may be passed to their offspring or to other ewes or lambs during lambing, or may contaminate the lambing site.
2. Lambs may not be checked soon enough after lambing and managed early enough for neonatal conditions and the lambs' disease susceptibility is thereby increased.
3. Pathogens present in pregnant ewes may be released into the farm environment during abortion and may be transmitted to other animals in the flock directly or via pests, dogs, cats, wildlife or working animals.
4. Mastitis severity and spread of contagious mastitis pathogens or exposure to environmental pathogens may be increased by lack of or incorrect udder preparation and care before and after milking.
5. Disease testing may be incomplete, leaving some diseased sheep unidentified and untreated and they may then shed disease into the flock.
6. Vaccination may not be undertaken for a disease of concern on your farm, and avoidable sickness and production losses may be experienced.
7. Treatment for internal and external parasites may not be undertaken on your farm and avoidable conditions and production losses may result.

3.1.7.3 Risk Management Practices

In the table below are some of the protocols you should use to establish the risk management practices in your farm's biosecurity plan for these potentially high-risk activities. The goal is to ensure that specific practices are in place on your farm, supported by descriptive protocols, to address the risks that can relate to these specific activities:

Activity	Suggested Protocols
Lambing	<ol style="list-style-type: none"> 1. Ewes and new born lambs should be moved to a pen as soon as possible after birth. 2. Lambs should have navels treated with iodine solution (2 ½% tincture of iodine is recommended) at this time and the ewe's udder should be checked to ensure she has normal and sufficient milk. 3. Lambs should be checked to ensure they have received colostrum within 4 hours of birth, sooner if possible. 4. Ewes should be checked to make sure they have passed the afterbirth, which should be removed from the pen and properly composted using the same protocols as deadstock. 5. Lambs should be uniquely identified. 6. If the ewes' diet is deficient, lambs should be treated with vitamin E and selenium before 24 hours of age using a licensed product and at label recommendations. 7. Castration and tail docking should be performed between 24 hours of age and 7 days. Use the Sheep Code of Practice to develop humane protocols.

Abortion management	<ol style="list-style-type: none"> 1. Immediately isolate the ewe, or remove other pregnant ewes from the area and from the ewe that has aborted 2. Remove and bag the foetus and placenta. Wear gloves and mask when doing so to reduce risk to your health. 3. If no diagnosis has yet been obtained for the abortions, hold onto aborted fetuses and placentas – chill, do not freeze – for submission to a veterinary diagnostic laboratory. If a diagnosis has already been obtained, manage the fetuses and placentas as deadstock. Prevent access by scavenging animals, cover to prevent wind-borne spread of the pathogens and assure that proper composting has occurred. 4. Disinfect the area where the abortion occurred (if possible) after lambing is complete and ewes have been removed. 5. Contact your veterinarian to discuss necessary diagnostic investigation and control measures. 6. Remember many causes of abortion are zoonotic – take precautions. Where dedicated protective clothing when handling aborted / aborting ewes, fetuses, stillborn and weak lambs. Wear disposable gloves and an N95 fitted mask. Keep the dedicated protective clothing in the management area where the aborting ewes are housed.
Milking	<ol style="list-style-type: none"> 1. Wear disposable gloves when milking to prevent spread of contagious mastitis pathogens. 2. Prepare the udder for milking by washing the udder and teats with an approved bovine dairy udder wash and dry thoroughly with single service towels. 3. Strip a small amount of milk from each gland using a strip cup to detect abnormal milk (colour, consistency). Palpate each gland to detect abnormalities (consistency, heat, fill). Inspect each teat end to detect sores that may be due to orf (soremouth) or over-milking. 4. Perform a California Mastitis Test (CMT) if any abnormalities are detected. If a reaction of 1+, 2+, or 3+ is detected or if the milk or gland is abnormal, take a sterile milk sample from the affected gland, label with the date, ewe ID and gland side and immediately freeze. Contact your flock veterinarian for submission for culture. 5. If pre-dipping is advised, use only an approved pre-dip product in the manner recommended on the label. 6. After milking (1 to 2 minutes), (machine milking only) remove the teat cups by breaking the vacuum. Immediately dip each teat using an approved bovine teat dip. Coverage should be on all sides of the teat and teat end. Spray, or preferably use a non-return teat cup. 7. At the end of milking, release ewes to a clean, dry environment (clean bedding or dry pasture) protected from adverse weather, with fresh, clean water provided in a tank. The area around the waterers needs to be kept dry to prevent mastitis. 8. Monitor somatic cell counts monthly and discuss protocols with your flock veterinarian or another advisor when abnormalities are detected. 9. Develop a dry period treatment program with your flock veterinarian or another advisor. 10. Since there are no approved products for dairy sheep, product selection and withdrawal periods for milk and meat will need to be developed using Canadian gFARAD recommendations. 11. Treated ewes should be appropriately identified and records kept to make sure their milk does not accidentally enter the food supply. 12. Have milking equipment maintained using manufacturer's recommendations. 13. Investigate udder health problems.

Disease testing	<ol style="list-style-type: none"> 1. Testing is very flock specific. Producers should determine the protocols for their flock, working with their flock veterinarian. The protocols may include: <ul style="list-style-type: none"> • Necropsies of animals that die or are euthanized, e.g. adult sheep with chronic wasting, neonatal lamb mortality, and abortions. • Routine blood testing for antibodies to diseases such as maedi visna and Johne's disease (paratuberculosis) • Fecal samples for gastrointestinal parasite eggs or coccidial oocysts, culture of bacteria for Johne's disease, culture of abscesses (e.g. caseous lymphadenitis)
Vaccination	<ol style="list-style-type: none"> 1. Determine the appropriate vaccine strategy for your flock in consultation with your veterinarian or other animal health advisor. 2. Diseases for which there are effective licensed vaccines for use in sheep include clostridial diseases (e.g. tetanus, pulpy kidney, gas gangrene), some abortion diseases (chlamydiosis, <i>Campylobacter fetus</i> ssp <i>fetus</i>), and caseous lymphadenitis. 3. Proper use of these vaccines should be discussed with your flock veterinarian to optimize their efficacy.
Parasite control	<ol style="list-style-type: none"> 1. There are internal parasites (gastrointestinal nematode parasites, tapeworms, liver flukes, lungworm and coccidia) and external parasites (biting and sucking lice, mange, keds, nose bots and ticks). 2. Control involves not only the use of prophylactic medications (e.g. dewormers, coccidiostats) but also environmental management and knowledge of the risks for infection present on your farm. 3. Work with your flock veterinarian or other animal health advisor to determine an appropriate deworming and external parasite control program.

3.1.8 Strategy 8 – Limit access by pests, dogs, cats, predators and wildlife

A pest control program is in place and its required procedures are followed. Dogs and cats are vaccinated and spayed and treated for diseases of concern. Their access to sheep housing areas and to manure, placentas, deadstock and other potential sources of contaminated material is controlled (e.g. reduce risk of infection with toxoplasma or dog tapeworms). A predator control plan is in place.

3.1.8.1 Description

Pests, dogs, cats and predators may carry diseases or parasites that can directly infect sheep (e.g. parasitism such as toxoplasmosis from cats and some dog tapeworms). They also have the opportunity to encounter infected material and to transport it to and possibly deposit it on your sheep. Infected material may be feces and other secretions, deadstock, placentas and aborted fetuses, and in some cases material picked up from live sheep or other animals, including blood and tissue. The infected material may be deposited directly on your sheep, but is more likely to be distributed in their environment – in feed and water, in bedding and on surfaces within their pens, sheds, etc. In the case of aggressive contact by predators, direct infection with rabies and other specific pathogens is possible.

3.1.8.2 Risks

1. Sheep may be infected by external parasites and/or the intermediate stage of dog tapeworms (e.g. *Cysticercus ovis*).
2. Infected material may be transmitted physically to the sheep environment – on feed, bedding and in waterers – either directly or through the pet's/pest's/predator's digestive system.
3. Cats with access to the flock may infect sheep with toxoplasmosis.
4. See also "Nature of Risk" in the table below

3.1.8.3 Risk Management Practices

In the table below is a list of potential pathogens (pests, dogs, cats, predators and wildlife), a description of the nature of the risk they represent, and a list of some of the proactive tactics you should include in your biosecurity plan to reduce the disease-transmission risk represented by their access to your sheep facilities:

Agent	Nature of Risk	Proactive Risk Management Practices
All	Access by pests, dogs, cats, predators and wildlife; transmission of pathogens by prior contact with placentas, deadstock, etc.	<ol style="list-style-type: none">1. Design and maintain facilities to limit access.2. Remove placentas, aborted materials and deadstock immediately and dispose of them in a secure location.
Pests (e.g. rodents, flies, other insects)	Transmission of pathogens by prior contact with other animals, manure, placentas, deadstock, etc.; direct interaction with sheep and contamination of feed, in storage or in feed bunks, and water	<ol style="list-style-type: none">1. Pest control programs that follow manufacturers' / suppliers' recommended application.2. Securely store feed.3. Install screening over vents and openings in barns and other buildings. <p>NOTE: Prevent access by sheep and lambs to pesticides and other control substances.</p>
Dogs and cats	Infection with diseases of concern on the farm (e.g. rabies); transmission of pathogens by prior contact with other animals, manure, placentas, deadstock, etc.; direct interaction with sheep and contamination of feed and water	<ol style="list-style-type: none">1. Discourage dogs and cats from entry into enclosed facilities.2. Vaccinate dogs against rabies and diseases that might be a concern, and treat effectively for tapeworm and other transmissible diseases and parasites. (Note that tapeworm medication requires a veterinarian's prescription, not an over-the-counter solution).3. Spay female cats and vaccinate against rabies and diseases that might be a concern.4. Securely store feed.5. Clean up faeces immediately.6. Dispose of feed and water contaminated by faeces and clean and disinfect feeders and waterers.
Predators	Direct attacks on sheep and lambs	<ol style="list-style-type: none">1. Employ guardian animals to reduce the activities of predators.

Wildlife	Direct or indirect contact	<ol style="list-style-type: none"> 1. Vaccinate the flock against diseases of concern. 2. Employ guardian animals to reduce the activities of predators. 3. Install fencing and maintain it in good repair to ensure that sheep are not released into uncontrolled areas and to limit the incursion of wildlife into the sheep pastures and other production areas.
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3.1.9 Strategy 9 – Implement health standards for guardian and working animals

Guardian and working animals are vaccinated, dewormed (e.g. tapeworms) and treated for diseases of concern.

3.1.9.1 Description

All guardian and working animals should be vaccinated against rabies and any other diseases of concern. Deworming with a product that is effective against tapeworms is also an important practice to maintain their health and to protect other animals on the farm.

3.1.9.2 Risks

1. Guardian animals may encounter wildlife that is infected with rabies and become infected themselves, and may transmit it to your sheep.
2. Guardian animals may be attracted to a dead sheep or lamb or to placentas or abortion materials and transmit pathogens to your flock.
3. Camelids (llamas, alpacas) share some diseases with sheep, and may infect them during close contact or by being housed in common facilities.
4. Guardian dogs may ingest tapeworm larvae or other larvae when scavenging deadstock and these might enable the development and transmission of tapeworms or larvae of different types to your sheep.

3.1.9.3 Risk Management Practices

1. Guardian animals should be vaccinated for rabies, and guardian dogs should be treated effectively for tapeworm.
2. If guardian animals are fed from deadstock, the deadstock should be frozen for a minimum of 14 days or cooked before feeding, to destroy and thereby avoid the transmission of any pathogens, especially *C. ovis*.

3.2 Principle 2: Record Keeping

Goal – Have records that validate the health status of your flock

3.2.1 Strategy 1 – Maintain and review farm records

Farm records for production, operations animal health and biosecurity are integrated together. Records include goals, analysis of the records to determine current flock status and strategies to reach goals, and are reviewed regularly. Records of health events and diagnostic test results are used both to initiate interventions and change to the flock health program, and are important when selling animals to other producers.

3.2.1.1 Description

Farm records should include:

- **Visitor log** – further described under Principle 4;
- **Production records** – a standardized way of recording daily, weekly, monthly or cyclical production that will allow comparison to production goals and between animals: milk production, lamb production, volume/weight/quality of wool produced, etc.;
- **Feed records and bedding records** – including source and location (on-farm or purchased);
- **Drug records** – keep lot numbers and expiration dates of medications;
- **Animal identification** – a standard way of identifying all animals in the flock, consistent with the *Canadian Sheep Identification Program* (CSIP) standards, that can be linked to an identifier on each animal when observations are made; basic information about their source and genetics, if available, would be included;
- **Movement records** – a standard way of recording animal movements on and off-farm, consistent with CSIP;
- **Monitoring/surveillance of disease occurrences and interventions** – notes describing observations of clinical signs and the progress of the disease from earliest stages to resolution; this includes disease surveillance at the farm-level carried out by producers to keep track of any health problems that they see and plan to review with their flock veterinarian. Examples include number of cases of pneumonia, number of animals culled for poor body condition, number of cases of diarrhoea in neonatal lambs etc.
- **Vaccination and drugs** – details of all vaccinations and drugs administered to each animal, and their effects;
- **Veterinary care** – a notation of treatments discussed with and administered by or under the guidance of the flock veterinarian, both preventive and responsive, and including treatment withdrawal plans and results attributed to the treatment; and
- **Disease-specific programs and control** – identification of specific diseases that are being actively managed on the farm, both as diseases of concern and under specific industry or regional programs (e.g. Scrapie, maedi visna) and record progress against the farm's goals and parameters and those of the programs in which the farm participates. This includes laboratory and necropsy results.

3.2.1.2 Risks

1. Health status records may not be available for review with potential purchasers; sales are missed or unnecessary risks are encountered by purchasers in the stock they buy from you.
2. Accurate drug treatment records may not be available and may lead to improper drug withdrawal times and increase the risk of selling animals with drug residues.
3. Performance records may not be available to allow you and/or your flock veterinarian to assess ongoing health of individuals and the flock and to determine the efficacy/effectiveness of your vaccination, treatment and health programs.
4. Disease status may not be recorded and required biosecurity practices might not be implemented by farm workers or others on the farm.
5. Records of zoonotic disease in the flock may not be available to farm workers; they might not take appropriate precautions and contract the disease.
6. Sourcing, vaccination, treatment, disease, and movement information on an individual animal may not be available in sufficient detail or in a useable form to assist you and/or your flock veterinarian in health assessment and diagnosis when needed.
7. Health issues may not be recorded and not reviewed, and may result in missed or incorrect response and/or treatment by farm workers and/or your veterinarian; disease spreads further into your flock.
8. Records of visits and movement of people on the farm may be needed to trace the progress of a disease outbreak and are not available (see also Principle 4 – People).

3.2.1.3 Risk Management Practices

1. A permanent, up-to-date record is in place that contains information about all sheep in your flock, including all topics included in the section above.
2. Establish a set of goals that can be used as the benchmark for observing relative success of your flock.
3. Records are kept on individual animals, each of which is separately identified.
4. Records are in a form that allows you to analyze the health and security of your sheep and understand the impact of animal health and biosecurity practices in meeting your flock production goals.
5. Records include your observations and notes from your analysis and are available to your farm workers who are responsible for the care of your flock.
6. Flock records are reviewed regularly with your farm workers and strategies for care and program improvements are developed.
7. Flock records are available for use by your flock veterinarian during visits, and are reviewed regularly to decide on changes to treatment regimens, animal health practices, and biosecurity plans.
8. Individual health status records are maintained and kept up-to-date with daily notation of observations made, diagnoses determined, vaccinations applied and treatments administered; contact and information exchanged with your flock veterinarian are included.
9. A summary statement of the flock health plan and flock health and disease experience are documented and updated for use by purchasers.

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10. Health status records are reviewed with farm workers when preparing their work plan; specific biosecurity practices that will be required are reviewed and *personal protective equipment* (PPE) and cleaning and disinfection (C&D) supplies are made available.
 11. Health status records are fully reviewed with your flock veterinarian on a regular basis, and adjustments to plans and practices are agreed and implemented.
 12. Flock production and health records are reviewed annually and compared to the flock goals to aid in your understanding of flock health experience over time, to show your improvements in response to your flock health strategy, and to help in your decisions about new targets and changes to your strategy.
 13. Flock-wide health status summaries are used in educating farm workers.

3.2.2 Strategy 2 – Record education and training activities

Records of education and training of farm workers are important both for internal farm purposes and to ensure that information potentially required for labour standards is available.

3.2.2.1 Description

Education and training of farm workers is increasingly important as more intensive farming methods are used and as the requirements of the market become more challenging. Employment standards and Occupational Health and Safety programs are being applied on farms, and as an employer you may be required to provide evidence that your employees have been trained how to do their jobs and how to do their jobs safely.

Farm workers need to be fully capable to carry out their assigned responsibilities in your sheep operation. They also need to be able to identify unusual behaviour and signs of diseases of concern in your animals. Farm workers should also know and be able to carry out all of your biosecurity practices, especially those relating to zoonotic diseases.

3.2.2.2 Risks

1. Workers may not recognize abnormal or disease signs and isolation and/or treatment might not be initiated, leading to the spread of disease and/or deterioration of the animal's condition.
2. Workers may not recognize signs of zoonotic disease or might not understand the importance of guarding against such infections, and may contract a disease themselves.
3. A worker may be harmed by a disease or contaminant, resulting in pain and suffering for the employee and loss of his/her work on your farm.
4. If records cannot be provided to confirm that a worker has been trained in the proper practices to avoid a disease contracted on your farm, costs, possibly including penalties, might accrue to you as the employer (please check the provincial labour laws that apply to your area).

3.2.2.3 Risk Management Practices

1. Employee records should be kept that meet all federal and provincial requirements and include emergency notification information.

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2. Employee records should contain details of training and education you have provided, including topic/content, date, nature and location of training and your assessment of the extent to which the knowledge transfer is working.
 3. Both formal and informal training approaches should be used; one-on-one and group instruction on specific topics or practices, and on-the-job instruction, correction and coaching, should be used to ensure that your workers have the required knowledge and understanding.
 4. A record of the education and training that has been given to each employee should be included in his/her employment records, and should be available for reference when new skills or changed practices need to be discussed. These records are also important in many regions as evidence of your due diligence in ensuring that your workers are properly trained for their positions, and that they understand and can properly address on-the-job risks, including zoonotic diseases.

3.2.3 Strategy 3 – Develop a response plan for disease outbreaks

A response plan is needed to guide farm activity in rapidly-developing and large-scale changes in health status. Enhanced biosecurity will be required and a recovery plan needs to be prepared.

3.2.3.1 Description

The Standard and this Guide are designed to provide a proactive biosecurity program for your farm. It is important also that you have a response plan in case a disease outbreak does occur on your farm, on a farm or facility that you have interacted with, or on a farm that is adjacent to or in your region. Its purpose is to identify and detail practices that respond specifically to the subject disease, to increase your defenses from acquiring the disease on your farm if the outbreak is elsewhere in your region, and to ensure that it is contained if it occurs on your farm. It will include “trigger points” – information, observations and actions taken that will indicate that a response at some level is required.

Your response will be different, depending on the nature of the disease outbreak. If the subject disease is a highly contagious, non-reportable disease, producers and veterinarians will take the lead in managing your individual and industry response. If the disease is suspected to be or is confirmed to be reportable, or is defined as an emerging or *foreign animal disease* (FAD), it will be the role of the Canadian Food Inspection Agency to lead the industry’s response and direct your actions. A list of reportable diseases is available on the CFIA website.

Producers would also need to know the enhanced biosecurity practices to be introduced if any of these disease emergencies did occur. These would include, but not be limited to:

1. Increased security – essentially, no visitors, and no unplanned or non-essential visits by service providers;
2. A notification procedure to ensure that local government officials, and the farm’s neighbours, trading partners and service providers know that a disease emergency is underway;
3. No movement of animals onto or off the farm;
4. No movement of deadstock or manure off the farm, and enhanced security of their storage areas;
5. Requirement that anyone entering or leaving the farm and anyone crossing between zones clean their hands and don cleaned and disinfected outerwear and footwear; and

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6. Increased cleaning and disinfection – no tools, equipment or vehicles permitted to enter and leave the farm without complete cleaning and disinfection.

To a large extent, the response plan will entail enhancements to your day-to-day biosecurity practices, such as more frequent and extensive cleaning and disinfection, more frequent changes of clothing and footwear, and more restrictive visitor policies and access controls. However, some additional activities may be required, possibly including movement restrictions, disease-specific vaccination, and pre-emptive culling.

It is important to note that preparation of complete disease emergency response and recovery plans is a significant undertaking, and requires more study than can be provided in the Standard and Guide.

3.2.3.2 Risks

Here are some of the risks you may consider when thinking about developing a response plan for disease outbreak emergencies:

1. A significant change in health status (a disease outbreak) may occur on your farm and because appropriate responses are not known, it might spread throughout your flock and causes widespread suffering and loss.
2. A disease outbreak may occur on your farm and because appropriate responses are not known, it might spread to neighbouring farms and farms and facilities elsewhere in the industry, causing suffering and loss.
3. A highly contagious non-reportable disease outbreak may occur on a neighbouring farm or in a farm or facility elsewhere in the industry and because appropriate responses are not known, it might spread to your farm via farm workers, service providers and/or visitors, causing widespread suffering and loss.
4. A reportable disease or FAD outbreak might occur on a neighbouring farm or in a farm or facility elsewhere in the industry and because required responses are not known or cannot be executed, it might spread to your farm via farm workers, service providers and/or visitors, causing widespread suffering and loss.
5. A recovery plan is not in place, and return-to-business protocols following a disease outbreak may not be carried out in reasonable time, leading to increased financial losses.

3.2.3.3 Risk Management Practices

1. A disease emergency plan should be in place that includes:
 - Identification and documentation of trigger points for outbreak conditions, specifically including
 - disease observations/identifiers for your flock and for your diseases of concern;
 - notification (formal or informal) from another producer or from an industry participant; and
 - notification of a suspected outbreak of a reportable disease by a CFIA representative;
 - Increased security – essentially, no visitors, and no unplanned or non-essential visits by service providers;
 - A notification procedure to ensure that local government officials, and the farm's neighbours, trading partners and service providers know that a disease emergency is underway;

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- A policy of no movement of animals onto or off your farm;
 - A policy of no movement of deadstock or manure off your farm, and enhanced security of deadstock storage areas;
 - A requirement that anyone entering the farm and anyone crossing into a zone clean their hands and put on cleaned and disinfected outerwear and footwear;
 - A policy limiting movement of people off the farm except under controlled conditions; and
 - Increased C&D – no tools, equipment or vehicles permitted to enter, move within or leave the farm without complete C&D.
2. Education and training of farm workers should be undertaken so that they recognize triggers and understand and can implement the required responses in your plan.
 3. Personal protective equipment and C&D materials and supplies for use in an outbreak situation should be identified and made available, and training for farm workers in their appropriate use should be undertaken.
 4. A recovery plan should be in place to enable an appropriately rapid return-to-business.

3.3 Principle 3: Farm, Facilities and Equipment

Goal – Minimize the effect that farm, facilities and equipment have as contributors to disease transmission.

3.3.1 Strategy 1 – Create a diagram of the farm layout and identify risk areas

A farm diagram is used to assist in the risk assessment, based on the diseases of concern.

3.3.1.1 Description

The physical layout of the farm will have considerable impact on your ability to house and move sheep in a way that minimizes disease transmission risk. The layout determines where and how closely you house animals of different disease status and different disease susceptibility, and how closely animals of these characteristics pass by one another when they are being moved, the concerns being direct (nose-to-nose) transmission, aerosol transmission and contamination with potentially infective organic matter. There is also a concern for transmission of risk materials from high-risk areas via tools and equipment and people to the pens and enclosure areas. The ease of access by service providers and visitors to sheep held in pens and other enclosed areas also represents an increased risk. There is also a concern for transmission of risk materials from high-risk areas via tools and equipment and people to the pens and enclosure areas. The ease of access by service providers and visitors to sheep held in pens and other enclosed areas also represents an increased risk.

Areas that should be highlighted on the farm diagram as important areas of biosecurity risk include:

- Access points
- Gates and barriers
- Visitor parking area(s)
- The barn, other shelters and housing areas

- Pastures
- Receiving and storage areas
- Shipping area(s); the loading chute
- Manure and deadstock management areas

Addressing these risks requires a risk analysis of the locations and pathways, and the animals, people and equipment that use them. A diagram that depicts the layout of the farm, including buildings, pens (general and special-use), pastures, and pathways, that allows simulations of housing and movement of sheep of different ages, disease susceptibility and disease status will help you carry out the analysis (Section 3.3.1.3 contains a complete “how to” guide for preparing a layout of the farm).

The result can be a (re)assignment of farm areas for specific purposes, including isolation areas used for sick sheep and for new additions, shearing pens, lambing areas, etc., and a redirection of movement pathways for each age/condition of sheep to avoid specific risks. In addition to the layout of the farm and its operating areas, design and materials used in its construction can also have an effect on the biosecurity of the facilities.

3.3.1.2 Risks

Potential risk analysis findings:

1. Susceptible lambs may be housed adjacent to sheep that have had contact with diseased animals, resulting in the lambs’ contracting a disease to which they are not immune.
2. Sheep may be housed in a pen that is down-wind from the isolation area; acquired sheep might be being treated for a disease that can be transmitted via an aerosol plume (e.g. Q Fever).
3. Regular movement of dairy sheep to the milking room may take them past an isolation area used for sick animals; they are potentially exposed to diseased sheep and to any potentially-contaminated manure and bedding that is left in the area or spilled in the pathway.
4. Manure-handling equipment may move directly past the lambing pens due to their location, and the same equipment might be used in the isolation area(s).
5. Visitors may be able to walk directly to the lambing pen(s) via the loading chute without encountering a barrier nor a notice of their entry into a high-risk area(s).

3.3.1.3 Risk Management Practices

1. Follow the process described in “Zoning and Pathways” and “Designing Biosecurity Zones and Areas of Specific Risk”, following, and prepare a set of drawings of your farm and your barn area(s); decide where your *controlled access zone* (CAZ) and *restricted access zone* (RAZ) will be and include them in your biosecurity plan (see the definitions below).
2. Using the farm layout diagrams, document general areas of high, medium and low disease risk, making notes about the activities and movements that lead to the risk classification.
3. Using the diagram of the barn and confinement areas, document specific pens, work areas and pathways that are of high risk and note the activities and movements that make them high risk. Decide where changes in pen use and modifications to the sheep movement pathways could be made to reduce the higher-risk situations.

4. Decide where dedicated tools and equipment need to be made available and where cleaning and disinfection of tools and equipment can be done.
5. Identify transfer points between areas of differing risk where biosecurity practices need to be followed, especially with respect to cleaning and disinfection of tools and equipment, hand washing, and changes of clothing and footwear.
6. Mark locations where physical barriers and/or signage are needed to ensure that unintended access to higher-risk areas is limited.
7. Ask help of an advisor, such as your flock veterinarian, when evaluating or re-organizing zone locations.

Controlled Access Zone (CAZ)

A CAZ is a buffer area, generally excluding the house and personal space of the farm family, and contains operational facilities indirectly involved in animal production. The CAZ would include areas in which sheep are less intensively managed and includes many areas in which farm service providers and farm workers would circulate – laneways, parking areas and equipment sheds, for example. It has its own specific biosecurity practices, and encloses the RAZ.

Restricted Access Zone (RAZ)

A RAZ houses, contains, or confines production animals and encompasses the area(s) of the farm in which sheep are housed, milked, pastured, worked, bred, treated and isolated, including the areas through which they pass when moving within it. The layout and management practices of individual farms will determine whether manure storage, deadstock handling/storage and other production facilities more directly involved in animal production should be contained within the RAZ.

Zoning and Pathways (Barn and Yard Flow)

The risk assessment process will identify risks associated with zones and risk areas on your farm. These will be zones and areas that enclose or are identified with certain practices and/or stages of the production process that have common or specific disease-transmission risks. You will select certain biosecurity practices to reduce specifically identified risks within these zones and areas. Using this approach focuses biosecurity planning on your farm, and provides clear identification of where practices apply.

Increasingly, producers are adopting farm zoning as a basic practice in the design of their biosecurity plans. Essentially, biosecurity zones identify areas of common or shared disease risk on a sheep farm.

Internationally, the concept of Controlled Access Zones (CAZ) and Restricted Access Zones (RAZ) has been developed, and has been adopted by some livestock and poultry sectors in Canada. This approach is used to identify relatively large areas of a farm for biosecurity management.

The purpose of zoning is to isolate the flock from contamination carried by outside agents – animals, people, tools, equipment, feed, water and pests entering the zone – and to contain any issues within the flock. Identifying and managing the additional biosecurity risk areas within the CAZ and RAZ also serve to isolate issues that could occur between parts of the flock or between an individual sheep and the rest of the flock. In a proactive way, identification of these areas helps to avoid *cross-contamination* between animals of different health status or susceptibility, and provides the ability to isolate tools and equipment used in each area.

Zones are provided to address two key concerns in preparing farm premises for biosecurity:

1. Identifying relative risks within the production areas and the pathways taken by sheep and equipment, and
2. Access by people and vehicles and the equipment they carry.

The practices that you will put in place within the zones on your farm will be determined by the risk assessment carried out for the access and activities of workers, service providers and visitors that are expected to circulate on your farm.

Although the CAZ and RAZ are recommended below to be identified on a map or diagram of your farm to help in the design of your biosecurity practices, the movement of your flock(s) with the seasons and with production cycles may suggest that you have “seasonal” RAZ definitions on your farm. This will allow you to maintain risk-reduction practices in the core areas in which your flock(s) is housed that are specific to these differing areas. In these cases, the RAZ will be defined more by the animals than by the facilities or areas on the farm. Nevertheless, the concepts that are established for a facility-defined RAZ will still apply – that defined biosecurity practices are required when the RAZ is “entered” to ensure that no disease risks are brought into the zone, and that none are taken away from it.

As your production cycles change, and areas of the farm become or cease to be controlled or restricted zones, clear communication with your farm workers and with repeat service providers and visitors about their use will be needed.

Within these zones, especially within the RAZ, there may be separate areas in which specific practices are carried out, such as:

- barns or shelter areas;
- working areas in which sheep are vaccinated, have their health examined, and/or are bred;
- milking parlour;
- pens or huts for isolation of lambs or for individual breeding;
- isolation area for sick animals; and
- isolation area for newly introduced sheep.

These are areas with specific disease risks, and therefore they may be subject to specific or additional practices over and above those established for the CAZ or the RAZ within which they are situated.

There may also be cases in which the whole sheep farm might be treated as a single zone. This would potentially occur on a farm on which the sheep are housed together and are handled as a single unit, and therefore are subject to shared risk. This might be a preferred approach for smaller flocks and also where facilities are not designed to allow separation. It can be managed using the principles established for zoning in the Standard, but will require the use of other biosecurity practices for entry and exit to accommodate the single-zone approach.

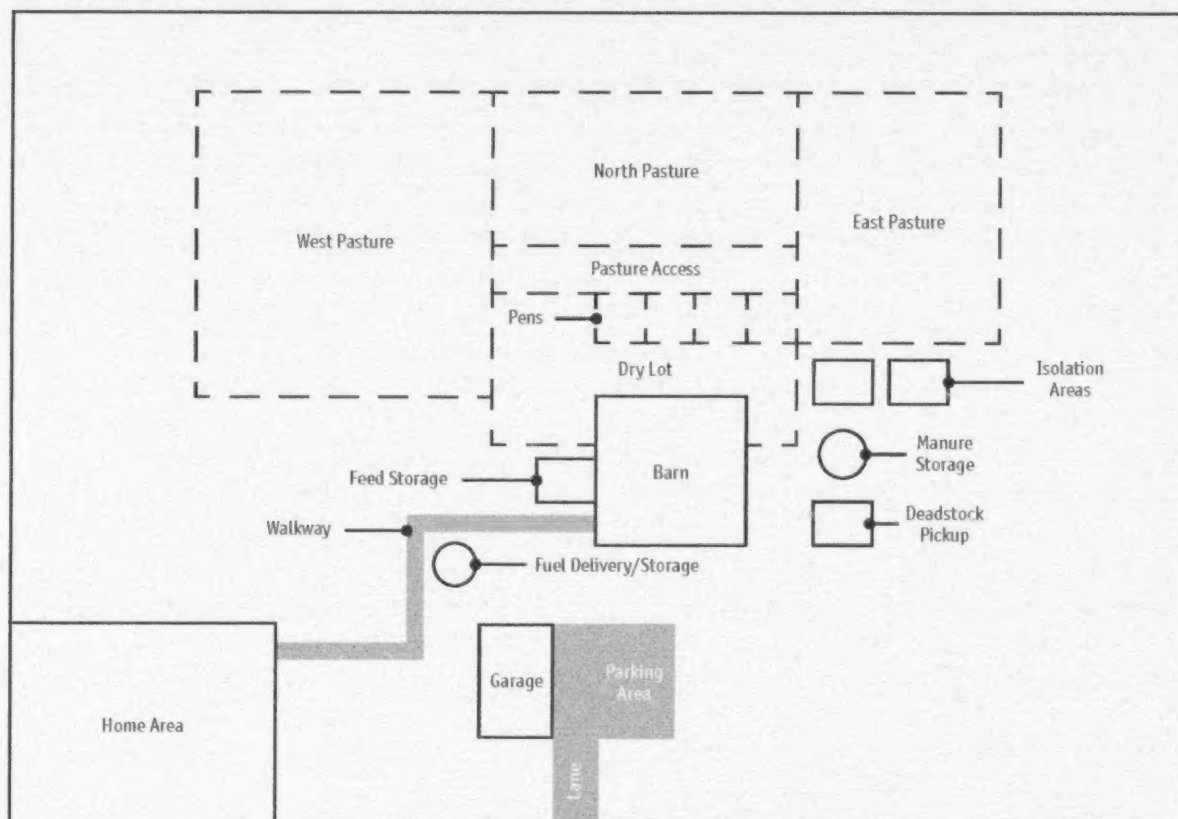
Designing Biosecurity Zones and Areas of Specific Risk

It is important to realize that the diagrams on this and the following pages are not intended to depict your farm. Rather, they include common areas and features that may exist on your farm, and are intended to be used for illustration and demonstration purposes.

1. Sketch your farm layout

Using a pad and pencil (or working on a printed Google map of your farm) prepare a simple map or diagram of your farm, indicating the following:

- Home area
- Farm buildings:
 - Barns
 - Sheds
 - Service areas
- Pens and confinement areas
- Feed storage area
- Manure storage area
- Deadstock pickup area or compost location
- Driveways and lanes
- Parking areas
- Fuel delivery/storage area
- Paths and walkways
- Pastures
- Wells and other water sources
- Housing and pasture areas for other farm animals



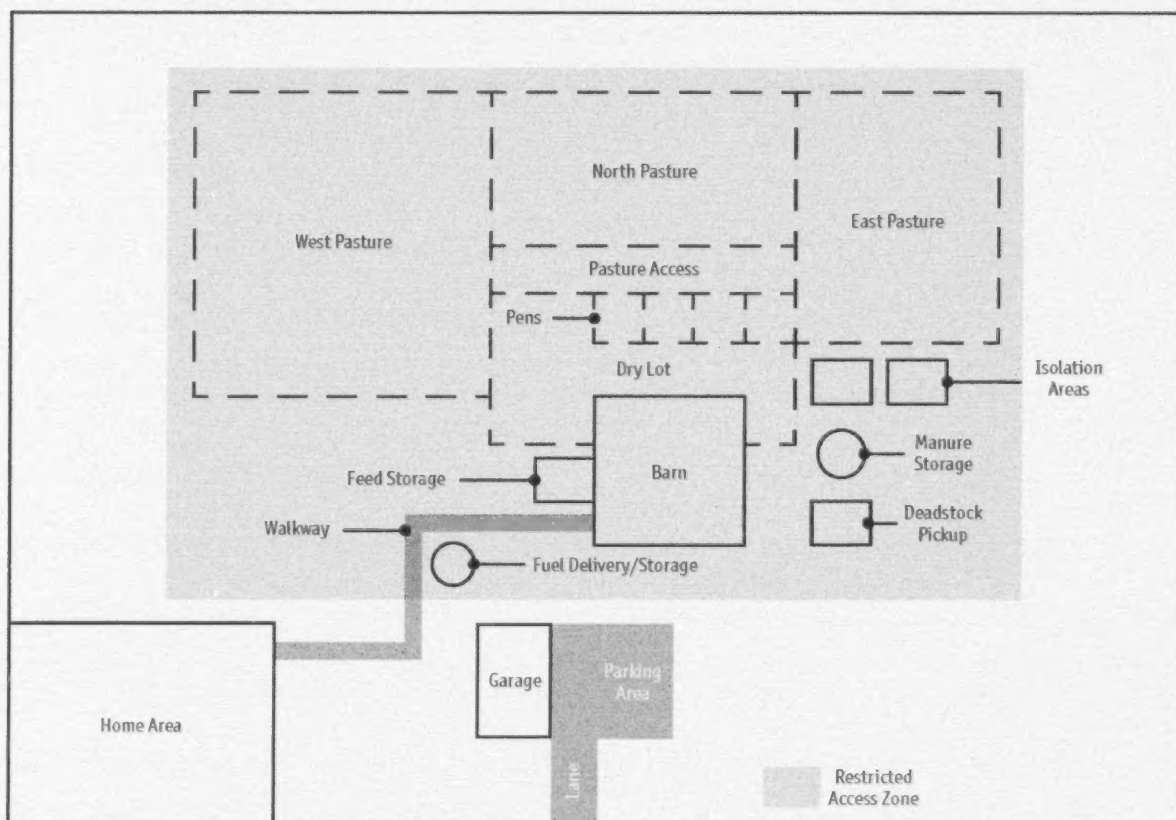
Sheep Farm Layout—1

2. Select the Restricted Access Zone

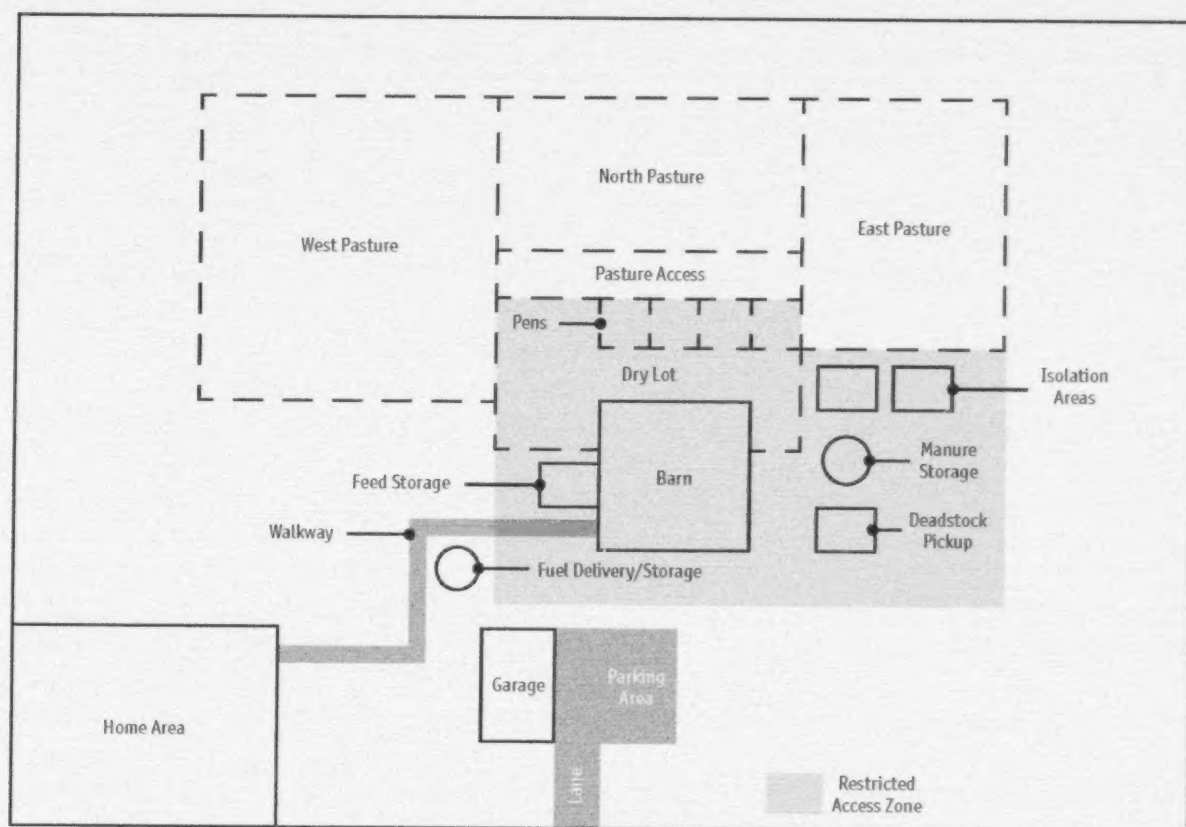
Thinking about where the sheep are housed and where they are likely to move about the farm, identify the production areas in which they should be protected from exposure to disease risk from outside the farm and in which they should be protected from disease cross-contamination within the farm. Also consider areas of potential traffic that are essential to the production area and areas of potential contamination that have similar risks to the active sheep production areas.

On many farms, the RAZ will include all of the production areas and the pasture areas (see Layout 2a). Defining a security zone to include pastures may be impractical on some farms. However, this option also creates a single zone for the full production facility and therefore reduces the number of times that sheep, farm workers and others will move from zone to zone and be required to carry out the required procedures.

Other farms may define their RAZ to include all of the working areas of the farm, but exclude pastures, for example (see Layout 2b). This approach applies to farms with larger and/or less-well-defined pasture areas and pastures that are difficult to control. This option allows a concentrated effort on biosecurity in the areas most frequently used by the flock, by workers and by farm service providers i.e. the highest risk areas.



Sheep Farm Layout—2a



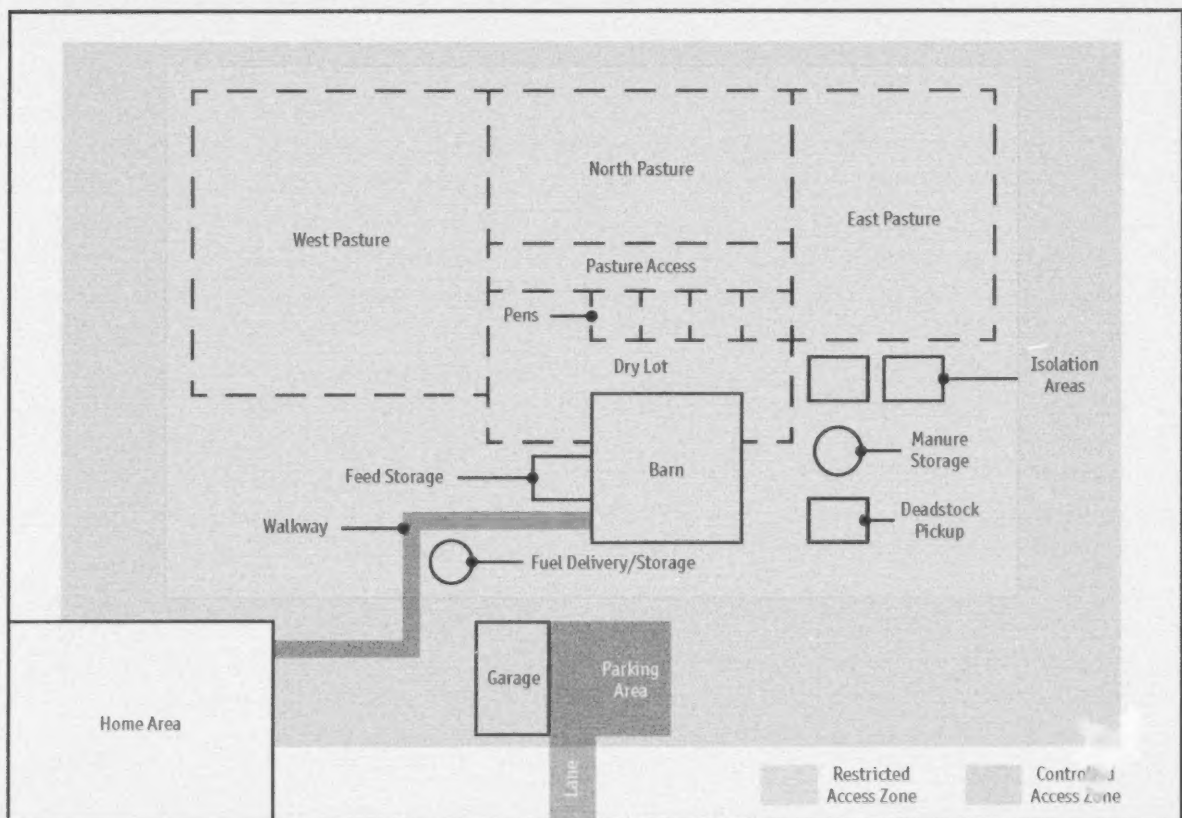
Sheep Farm Layout—2b

3. Select the Controlled Access Zone

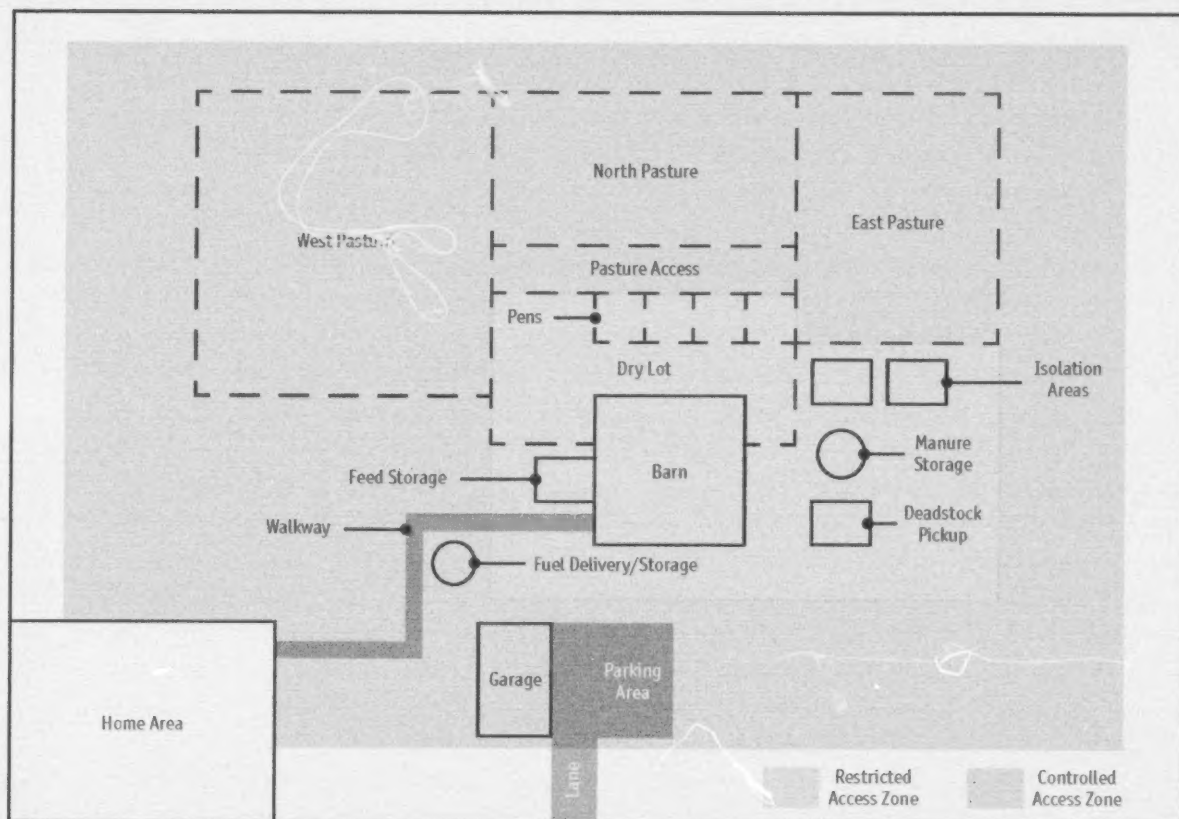
Once the RAZ has been determined, consider the areas that should be designated the Control Access Zone (CAZ). As described above, the CAZ contains operational facilities indirectly involved in animal production. It includes many areas in which farm service providers and farm workers would circulate in entering and leaving the production area, and when they are not actively engaged with the sheep – laneways, parking areas and equipment sheds, for example. It encloses the RAZ.

When the RAZ includes pastures, the CAZ also serves as a buffer for all of the areas in which sheep could be found (see Layout 3a). In this way, it is a relatively small border area that provides a transition to/from areas of the farm not directly employed in sheep production.

When the RAZ is designed to include only the more active sheep production areas, the CAZ will be used to define the practices required to be followed in the pasture areas (see Layout 3b). It will also serve, as in the previous option, to contain the indirect production activities and enclose the RAZ.



Sheep Farm Layout—3a



Sheep Farm Layout—3b

4. Identify Access Control Points

When the zones have been designed to suit the farm's physical layout and its production practices, access points are identified (a limited number of places at which people, animals and tools/equipment/vehicles cross into and out of the zones). Some of these will be where gates, doors, lanes and pathways already exist. Others will be defined by specific activities – the movement of manure, the location of isolation areas for sick sheep, the delivery of feed, for example.

Access control points are usually physically identified, and specific practices are required to be followed whenever animals, people or tools/equipment/vehicles move into or out of the zone. These are the critical points at which the principles of excluding diseases from production areas and containing diseases within production areas are applied.

At all access control points, the key concept is to dispose of or clean and disinfect any materials, clothing, equipment, or any other fomites when moving from one risk area to another, and to require people themselves to be free of potentially infectious material before entering a zone. This principle applies to people, equipment and vehicles, and also to any movement of animals from zone to zone.

For example, solutions for workers and visitors include:

- Physical separation between zones,
- Hand washing and boot cleaning stations at the access control points,
- Availability of clean and/or zone-specific coveralls and boots or footwear coverings,
- A dedicated area set aside for people for cleaning and disinfection and changing clothes at the access control points, and
- A dedicated area set aside for cleaning and disinfection of equipment and materials at the access control points.

Solutions for animal movement include:

- Physical separation between zones,
- Sequencing of movement of animals of different disease status and relative disease susceptibility,
- Isolation until disease status is resolved, and
- Enhanced cleaning and disinfection of areas in which sheep have been held and through which they have passed.

5. Identify specific risk areas

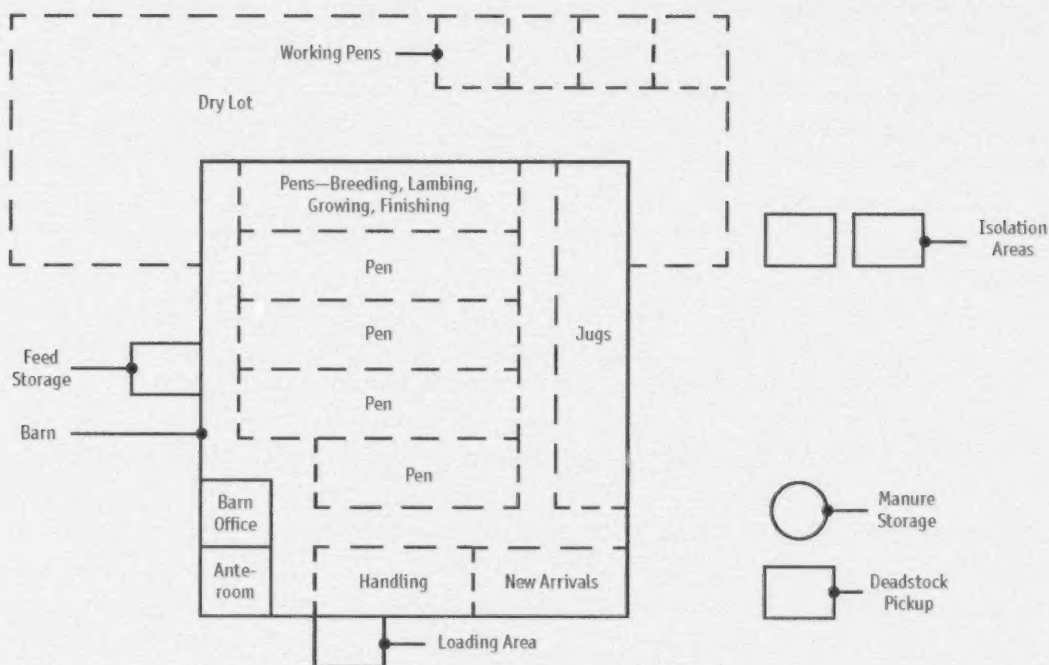
Copy the main production areas from your farm map/diagram onto a fresh sheet in larger scale. It will be useful to keep them in similar relative positions and in somewhat similar proportion as in the farm map. Identify the activities that are undertaken in each of the areas on this production-area diagram, both outside and inside the barn of the main production structure.

In dairy operations, these areas may include:

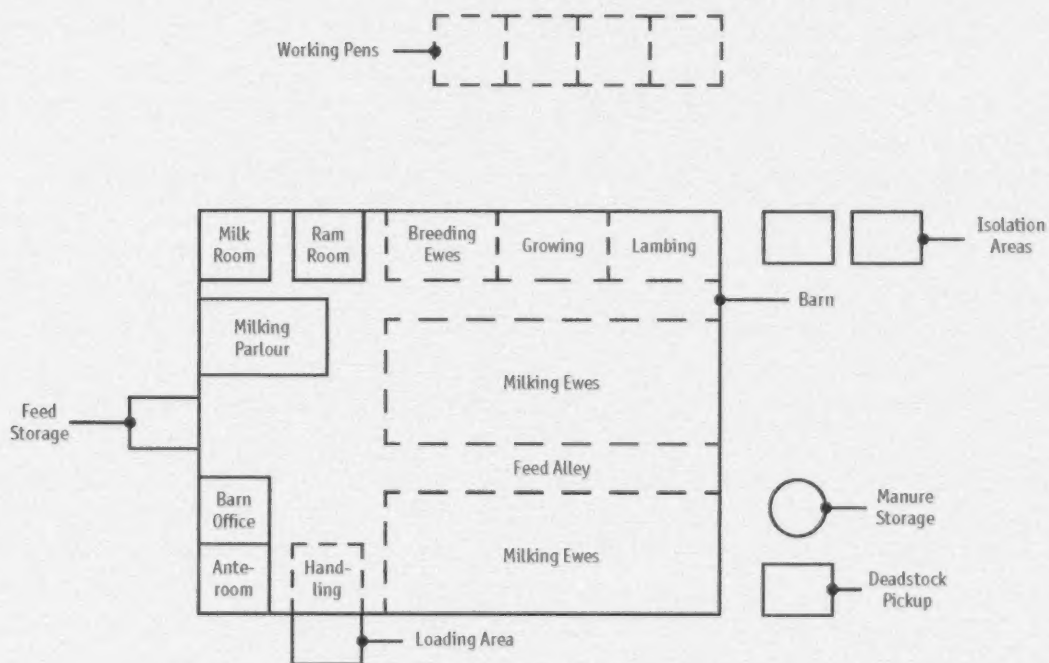
- Milking ewe pens
- Ram area/room
- Breeding ewe pens
- Lambing pens
- Weaning pens
- Isolation areas
- Isolation area for sick sheep
- Breeding area(s)
- Shearing area
- Working areas
- Milking parlour
- Milk room
- Chute system and handling area
- *Loading and unloading area*
- Feed storage
- Manure storage
- Deadstock pick-up/disposal

In meat operations, these may include:

- Breeding, lambing, growing, finishing pens
- Isolation areas
- Working areas
- Jug area
- Chute system and handling area
- Loading and unloading area
- New arrivals area
- Feed storage
- Manure storage
- Deadstock holding/disposal



Meat Sheep Farm Layout: Specific Risk Areas



Sheep Dairy Farm Layout: Specific Risk Areas

Looking at these and other areas that are set aside on your farm for specific activities, undertake a risk analysis on the activities and on the areas that are identified with them. This may be as simple as a classification of areas as low, moderate and high disease risk, based on:

- the health condition and susceptibility of the sheep that could be brought into the area
- the nature of the activity
- the sheep's length of stay in the area
- the likelihood of contact with other sheep

Consider also:

- areas where all visitors are allowed;
- areas where some / all visitors are restricted (e.g. should change clothing and boots, wash hands before being admitted); and
- areas where animals of differing health status are housed (e.g. new introductions, sick animals, animals on a health program)

as basic requirements for each of the specified risk areas inside and outside the barn.

It is important to note that while pathways for animal movement are important, it is also very important to consider the physical location of various groups of animals – their proximity to others, their location relative to traffic barriers, and air movement in the area, for example.

There will be areas in which naïve or more susceptible animals are housed, such as lamb pens or the maternity area, and areas in which a higher likelihood of disease contamination might exist, such as isolation areas used for sick animals or new additions. Also, pathways between these areas of differing risk and pathways that are susceptible to contamination by sheep, equipment or personnel need to be identified. Both need to be addressed in your farm's biosecurity plan.

Preparing a list of these areas and pathways, and/or locating them on a sketch of the barn(s) and other production areas will be useful for you in illustrating where there are areas of greater or lesser risk for disease transmission, and therefore where best practices should carefully be considered. The pathways identified for animals and other activity also point out where specific contamination risks should be addressed.

Finally, for those producers who need to design zones for different stages of your production cycles, additional versions of the diagrams and the accompanying practices may be needed in order to communicate all of the zoning options to be used on your farm.

3.3.2 Strategy 2 – Clean and disinfect facilities, equipment and vehicles

Cleaning and disinfection methods that are effective in reducing the risk of disease transmission are in place and are used for facilities, equipment and vehicles on the farm.

3.3.2.1 Description

Cleaning and disinfection (C&D) is a routine set of activities in certain areas of the farm for most producers – the milking parlour, the barn entry, and probably the isolation area for sick sheep. Equipment and tools are cleaned and disinfected before and after use in most cases, especially when contamination with excretions and body fluids are involved. On some farms, vehicles have been cleaned and some disinfected when they are scheduled to deliver sheep. C&D of footwear and hands is also a practice when farm workers and service providers are entering and leaving high-risk areas on many sheep farms, although different standards are applied to certain personnel.

Using the risk areas identified with the help of the farm diagram in Strategy 1 above, specific C&D requirements can be identified for high-risk areas. A standardized five-step process for C&D can be used in all cases of facility, equipment, tools, vehicles and personal hygiene, and is summarized in the Risk Management Practices section below.

Most disinfection products will specify concentrations of product to be used, exposure times, and effectiveness on specific surfaces and will require drying of the surface before it is put back into service.

3.3.2.2 Risks

1. Healthy animals may be exposed to potentially infectious body fluids, manure and possibly tissue from other sheep and animals that may have come in contact with tools and equipment used by farm workers and service providers on the farm .
 - these contaminants may have come from high-risk areas of your farm, or might have been transported to your farm from another location.
2. Healthy animals may be exposed to potentially infectious body fluids, manure and possibly tissue from other sheep and animals that have come in contact with surfaces, including waterers and feeders, on your farm.
3. Healthy animals may be exposed to potentially infectious body fluids and manure from other sheep and animals that have been transported in vehicles moving your sheep to and from the farm
4. Farm workers, service providers and visitors may move potentially infectious material from area to area around your farm, and may bring such material to your farm, depositing it on your sheep or other livestock and/or in areas they move through.
5. Surfaces in your facilities may be constructed from materials that are rough and porous; potentially infectious materials can harbour in the porous materials, may not be effectively eliminated, and may be transmitted to your healthy sheep.

3.3.2.3 Risk Management Practices

1. Facility surfaces, tools and equipment, and vehicles are cleaned and disinfected, using the Five-Step Cleaning Process described in the table below, on a schedule determined by a risk assessment process carried out in advance.

Five-Step Cleaning and Disinfection Process

1.	De-bulk	Remove all visible contamination from surfaces of your facilities, tools and equipment, and vehicles. This typically involves a combination of machinery, shovels, brooms and water.
2.	Wash	When the area looks clean it should be washed using a soap or detergent. This should include physical scrubbing; for facility surfaces, tools and equipment and vehicles, using either brushes or a pressure washer is required.
3.	Rinse	After washing, all soap and residue should be removed by thorough rinsing.
4.	Disinfect	For facilities, tools and equipment, and vehicles, the area should be soaked with an approved disinfectant that is appropriate for the pathogen(s) you are targeting. The disinfectant should be made at the correct concentration and left on the area to be disinfected for the prescribed length of time.
5.	Rinse	When required, all traces of the disinfectant should be rinsed away and the area left to dry.

Feedlot operators, and others who might be concerned about the biosecurity risk in pasture areas, can employ a downtime cycle between uses that is long enough to allow pathogens to be reduced by natural causes and to allow chemical agents to deactivate/disperse.

2. When dedicated equipment cannot be made available for specific farm tasks, such as loader buckets for handling manure and/or buckets, forks and shovels for bedding and feed (see Strategy 4 below), this equipment should be cleaned and disinfected between different uses and when conditions require, based on a risk assessment of their use.
3. Pathways used by sheep should be scraped and cleaned regularly, as required by frequency of use, and disinfected when used by sheep of different disease status and/or susceptibility, based on a risk assessment of their use. For example, pathways should be fully cleaned and disinfected when an animal that has used them is or has been found to be suffering or carrying a disease of concern; and pathways that are in regular use should be cleared of manure and other debris at a frequency that avoids build-up of these materials that results in its being transported by the animals around the facility and to their pens and other housing areas.
4. Pens and other containment areas should be cleaned and disinfected, based on use and a risk assessment to determine frequency and trigger points similar to that described above for pathways, but also whenever placentas, aborted fetuses and placentas from aborted births are discovered.
5. Vehicles arriving at the farm should be cleaned and disinfected before arrival, based on a risk assessment of their use and the area(s) of the farm they are intended to cross.
6. Feeders and waterers should be cleaned and disinfected on a regular basis based on use and experience; whenever contamination with manure, urine and/or other potentially-contaminated materials are found in them; and whenever they are being prepared for use by other sheep after having been used by a sick animal.

3.3.3 Strategy 3 – Reduce risk in barns/pens

Facility design and management practices reduce specific risks.

3.3.3.1 Description

The identification of zones and specific risk areas on the farm will bring attention to certain facilities and services on the farm. Many aspects of farm facilities – building styles and materials, location of entryways, location of pens and the milking room layout, for example – cannot easily be changed to improve biosecurity risks, unless new construction or renovation for other reasons is planned. However, consideration for the maintenance and use of existing facilities will be an important part of your overall program.

Some production processes can also be adopted that will enable reductions in biosecurity risk, determined by your diseases of concern and your existing facility designs.

3.3.3.2 Risks

1. Construction materials used to enclose the pathway from the milking ewe area(s) to the milking room and the walls in the milking room may be rough and porous, and limit the effectiveness of daily cleaning and disinfection; they therefore may harbour infectious materials that are frequently exposed to the milking sheep.
2. The loading area may be adjacent to pathways or pens that are used by long-term and/or more susceptible members of the flock; newly-arrived animals may transmit pathogens to the sheep using these areas before they are moved to isolation elsewhere on the farm.
3. The barn layout and feed storage location may require that feed is distributed to all pens and production areas from one barn access point; movement of feed distribution equipment therefore crosses all production areas and potentially cross-contaminates the pathways.

3.3.3.3 Risk Management Practices

Facility Design

1. Where layout changes cannot be made, other biosecurity principles can be used to reduce risks that remain inherent in your facility:
 - sequence of movement of animals with certain attributes,
 - more frequent cleaning and disinfection of certain areas (e.g. lambing pens), and
 - use of alternate pens, buildings or facilities for certain practices (e.g. isolation area for new introductions).
2. For the longer term, when remodelling and/or new construction is considered, you can refer to this model when designing the new facility, and include biosecurity solutions in the location of areas of differing risk and in the pathways between them:
 - Designs that provide less opportunity for potentially-contaminated material to remain in pathways and facilities will represent less risk to your sheep.

- Materials that are less porous/open, and materials that are painted/coated to create a smooth and resilient surface, will both resist build-up of *organic material* that can contain pathogens, and be more easily and successfully cleaned and disinfected.

Management Practices

1. In meat operations, a modified all-in/all-out scheduling process can be adopted if facilities permit housing of several groups with common disease risk profiles. This will allow group handling for convenience and efficiency, and reduces concern for commingling among animals from different sources or of different disease susceptibility.
2. Similarly, sheep of different susceptibility can be sequenced for handling and for common production activities, such as shearing – youngest and most susceptible to older/less susceptible; sick sheep last.

3.3.4 Strategy 4 – Reduce risk from equipment

Equipment can be dedicated for one purpose or dedicated for use in one risk area; equipment can be supplied by the farm for use by contracted service providers.

3.3.4.1 Description

In some sheep operations where size permits and where risk analysis indicates that use of equipment in multiple areas of the farm or for multiple purposes is not advisable, equipment that is dedicated to a purpose or restricted to work performed in one area can be a solution.

For instance, using the same equipment, such as a loader bucket or a barrow for moving feed and managing manure, can introduce a significant risk of feed contamination from the manure. Not cleaning and disinfecting between uses is a major risk.

Also, using a fork exclusively for all chores in the isolation area, for example, would not avoid the requirement for C&D, but would ensure that the risk of transmission of a disease from the isolation area to another part of the flock would be avoided. If you consider these risks to be too high, then dedicated equipment in these areas and for these purposes can be purchased and used.

Equipment that is used on many farms and brought to your operation by service providers also represents a risk of disease transmission. Shearing equipment, hoof trimmers and handling equipment are examples of equipment that could be provided at the farm, and used only with your sheep, thereby avoiding the risk of disease transmission from other sheep operations.

3.3.4.2 Risks

1. Contaminants, such as manure or deadstock residue on buckets or other loading equipment, may be transmitted to feed when the equipment is used for that purpose.
2. Nicks from normal shearing activity may become infected by pathogens on shearing equipment brought to your farm by your shearer.
3. Pathogens on hoof trimming equipment may be transmitted to your flock by the hoof trimmer in his normal activity.

3.3.4.3 Risk Management Practices

1. Based on your analysis of the risks presented, you should purchase and use a dedicated set of equipment for use in each of the following areas:
 - Isolation areas for sick sheep
 - Isolation areas for new additions
 - Lambing pens
2. Based on your analysis of the risks presented, you should purchase and use a dedicated set of equipment to perform each of the following tasks:
 - Manure handling
 - Deadstock management
 - Feed management
 - Bedding management
3. Your biosecurity plan should include the use and maintenance of this dedicated equipment in practices designated for these areas and activities.
4. If dedicated equipment for specific risk areas or for individual activities/tasks is not feasible in your operation, you should ensure that all equipment and tools are cleaned and disinfected after each use and stored in a clean area.

3.3.5 Strategy 5 – Reduce risk from vehicles

Vehicle use patterns determine the relative risk of vehicles; cleaning and disinfection is the principle biosecurity tool for reducing vehicle-related disease risk. Using farm-based vehicles can improve producers' control over vehicle use patterns.

3.3.5.1 Description

Vehicles arriving from off the farm to deliver feed or other goods, to pick up or deliver sold/acquired animals, to pick up or deliver manure and to pick up deadstock all represent differing levels of risk to your flock. These vehicles and their drivers/passengers need to move to different areas of your farm to complete their tasks, and will have been well or badly prepared for their visit with regard to the potential contaminants they might be carrying, either on the outside of the vehicle, in the load area, or in the cab, and on any equipment and tools they might bring along.

While having requirements for cleanliness for all of these vehicles and a clear set of routes for each to follow, given their purpose, will be an important part of your farm's biosecurity plan, enforcing those requirements is sometimes difficult, due to sequence of delivery, time of year, economics and so on. An alternative is to undertake as many of these tasks with your own dedicated vehicle, particularly those with inherently higher risks.

3.3.5.2 Risks

1. The undercarriage of a truck from off your farm may harbour contaminated material from a visit at a previous farm or other facility, and may deposit it in an area of your farm across which sheep are moved when returning from pasture.

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2. The interior load area of the vehicle might not have been sufficiently cleaned and disinfected after its last use, and contaminated material may be delivered along with the feed that is off-loaded.
 3. A driver who is not familiar with the zone boundaries and the biosecurity practices on your farm may drive to the loading chute and walk through the barn to the milking parlour looking for direction and may deposit contaminated material along the way.

3.3.5.3 Risk Management Practices

1. Continue to enforce the core practices for cleaning and disinfection of all vehicles entering your farm, as determined by the risks they represent, and the routes they follow while on your farm.
2. Replace off-farm vehicles by farm-controlled vehicles for high-risk activities such as movement of animals and transport of manure.

3.3.6 Strategy 6 – Manage manure

Manure is removed regularly and moved in a manner that limits exposure to the sheep. Tools and equipment used for manure handling are not used for feed or bedding and they are cleaned and disinfected between uses. Storage is secure and separated from the production area(s). Distribution is controlled.

3.3.6.1 Description

Removal of manure from the production area is an ongoing and normal part of sheep farming. However, if a disease is present in the flock, manure is also a very effective medium for the survival of pathogens and their transmission to other members of the flock.

Equipment that is used to move manure has been discussed in earlier Strategies; it should not be used for other purposes, particularly the movement and handling of feed or bedding, and needs to be cleaned and disinfected regularly.

3.3.6.2 Risks

1. Manure that is harbouring pathogens may remain in the production area and comes in contact with healthy sheep, thereby risking disease transmission.
2. Manure from (a) potentially-infected sheep, for example in the isolation area or the isolation area for sick sheep, may be spilled during movement in a pathway used by highly susceptible sheep in your flock, or finds its way into their pen(s).
3. A bucket on a skid-steer used to move manure may not be (properly) cleaned and disinfected before being used to transport feed from storage to the feeders; potentially disease-carrying material might then be distributed into many of the feeders and be ingested by several flock members.
4. Runoff from the manure storage area could flow across a pathway used by sheep returning to the barn from pastures.

3.3.6.3 Risk Management Practices

1. Manure should be removed on a regular schedule based on risk and the frequency of use of the pathways, pens and other housing areas:
 - care should be taken not to cross-contaminate sheep of different susceptibility with manure being moved
 - spills should be cleaned up immediately
2. As manure is removed, it should be moved as directly as possible away from the flock, and avoid pens and areas in which highly susceptible sheep are penned.
3. Manure should be moved directly to a secure storage facility away from the active production area.
4. The manure storage facility should be designed to eliminate runoff into the production area.
5. Manure should be spread on pasture only when sufficiently composted and long enough before its use for pasturing sheep and/or other susceptible species to be sure that any potential disease risk is minimized; this is especially true when the manure has been taken from or is mixed with manure from isolation areas.
6. Equipment used to collect and move manure should be cleaned and disinfected after use, and if possible should be dedicated to that purpose.
7. Scrapers, shovels, barrows and power equipment that are used for removal should be dedicated for the purpose, and/or cleaned and disinfected between uses.

3.3.7 Strategy 7 – Manage feed, water and bedding

Feed, water and bedding serve to support sheep health and therefore the flock's resistance to disease. Adequate and quality supplies are required, and storage is secure from contamination.

3.3.7.1 Description

Sufficient feed of good quality is secured and made available to the flock; standards for feed include freedom from toxins, especially copper, which is a significant concern for sheep health.

Fresh water is provided to the flock sufficient to their needs. Bedding is produced on the farm and/or purchased from off-farm sources. It is stored for use on the farm, facilities for which are determined by local weather conditions and available space.

3.3.7.2 Risks

1. Purchased or grown feeds may not contain sufficient food value for optimum health in your flock.
2. Feed may contain naturally-occurring toxins and/or is degraded by toxins that form in storage.
3. Feed may lose quality and food value through spoiling due to wet or contaminated storage, and nutritional value received by your sheep is lost.
4. Feed may be contaminated by faeces deposited by rodents, wildlife, pests, dogs and cats that are able to enter its storage facility.
5. Feed bunks and other feeders may become soiled by manure and other contaminants that are then ingested by healthy sheep.

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6. Clean water may not be available in sufficient quantity to satisfy the needs of the flock.
 7. Water bowls, troughs and/or other waterers may become soiled by manure or other contaminants that are then ingested by healthy sheep.

3.3.7.3 Risk Management Practices

3.3.7.3.1 Feed

1. Feed should be secured from a supplier(s) that produces a high value, healthy product that arrives in a clean condition.
2. The product should be tested and the ration supplemented as required to ensure optimal production and good health among your flock.
3. Feed samples should be taken and stored separately to allow testing for nutritional value, quality and the absence of toxins, especially copper.
4. Feed should be stored in a secure, clean and environmentally-controlled facility that limits degradation of feed by toxins and limits the access by wildlife, rodents, pests, dogs and cats while in storage.
5. When degradation of feed by toxins or access by wildlife, rodents, pests, dogs and cats is discovered, the degraded or contaminated feed should be removed and the cause of the degradation and/or contamination addressed.
6. Movement of feed from storage to feeders should be carried out in clean, preferably dedicated equipment, and handled using clean tools.
7. Feeders should be designed and positioned to resist fecal and other contamination by sheep or by dogs, cats, pests and rodents while in use; when found, contaminated feed is removed and disposed and the feeder(s) is cleaned and disinfected before being put back in service.
8. If contamination has occurred, the design, height and positioning of the feeder should be reviewed to see if a change is required to avoid such contamination.
9. Lot numbers and/or purchase date of all feeds should be recorded.

3.3.7.3.2 Water

1. Water should be tested at source at least annually to ensure its suitability.
2. Water bowls, troughs and other waterers should be designed and positioned to resist fecal and other contamination by sheep, dogs, cats, pests and rodents while in use and are checked regularly for cleanliness; when found, contaminated water should be disposed safely and the waterer(s) cleaned and disinfected before being put back in service.
3. Should contamination with faeces, urine or other risk material occur, the design, height and positioning of the water trough or bowl should be reviewed to determine if a change is required to avoid such contamination.

3.3.7.3.3 Bedding

1. Bedding should arrive in a clean, uncontaminated condition and be stored in a manner that preserves its condition for use.
2. Soiled bedding should be removed regularly, following procedures determined by a risk assessment of the different pens and housing facilities used by your flock.
3. Potentially-contaminated bedding should be removed immediately and disposed safely away from the flock.

3.3.8 Strategy 8 – Apply shearing protocols

Order of shearing is important to reduce the risk of disease transmission within the flock; equipment should be cleaned and disinfected between groups when health status is different, and contract shearers should wear clean outerwear and cleaned and disinfected footwear when they enter the premises.

3.3.8.1 Description

Shearing is usually provided by a specialist who visits your farm on a regular cycle and/or when called. Generally, the shearer brings specialized equipment that is designed to safely and efficiently shear sheep of all ages and conditions on your farm, and works continuously until all of the sheep have been sheared. Some farms have or use a segregated working area in which the shearer can operate; sheep are then brought to the working area for shearing.

As with on-farm shearing, consideration for the order of shearing and maintaining the cleanliness of the equipment, should any potential disease concerns surface, are ongoing concerns. Nicks and some cuts are normal by-products of shearing, and these minor injuries are fertile sites for development of abscesses and are potential entry points for disease.

3.3.8.2 Risks

1. The shearer's equipment may not have been cleaned and disinfected between uses/flocks and it might transmit pathogens from another flock to your sheep via their nicks and cuts.
2. The shearer may have attended several shearing jobs before arriving at your farm and his/her coveralls and boots may be soiled from the previous visits with potentially infectious materials.

3.3.8.3 Risk Management Practices

1. Sheep should be sheared in order from youngest to oldest, most susceptible to least, and healthiest to least well.
2. Shearing equipment should be cleaned and disinfected between each use, and ideally also between groups of your sheep that are of different disease status and susceptibility.
3. The shearer should change into clean outerwear, wash and disinfect his/her hands and clean and disinfect his/her footwear before entering your shearing area, and ideally should repeat these activities between groups of your sheep that are of different disease status and susceptibility.
4. Cuts and nicks should be treated immediately, so that abscesses are minimized.

3.3.9 Strategy 9 – Manage needles and sharps

Needles and sharps should not be reused; if they are reused, a risk assessment is conducted to evaluate the risk. Reusable needles are available for use in multi-dose injection syringes. Proper injection practices are followed and sharps are disposed of appropriately.

3.3.9.1 Description

Vaccination and treatment with injectables are generally done by producers for their own flocks. While reuse of needles is a high-risk activity, costs and convenience/efficiency lead some producers to reuse needles until they are worn. Disinfection of needles between uses is also not frequently practiced, partly due to the inconvenience of doing so and partly due to the incorrect belief that pathogens and bacteria are all destroyed in injectable products.

Three sections of the Food Safe Farm Practices program relate directly to needles and sharps, and they are inserted below for your reference.

Section 1.3.5 “Needles should be removed from bottles before storage to help prevent contamination of the animal health product”

Section 1.4.4 “Check and replace needles before they are dulled or bent. Do not straighten bent needles as they are more likely to break”

Section 1.4.5 “Dispose of all used needles in a puncture resistant sharps container”

Reuse of sharps (e.g. scalpel blades) and needles is a high-risk activity because their surfaces become contaminated with blood and other bodily fluids during use – in the case of needles, on both the inside and the outside. It is practically impossible to successfully clean and disinfect a needle. The risk of reuse is higher if the needle contains blood, has been used to treat a diseased animal, or has sat for any length of time between uses. The risk is lower if needles are used to administer a drug subcutaneously to a series of healthy animals at one time using one product.

Reusable needles (short ones with metal hubs) are available for use in multi-dose injection syringes and are less prone to bending and breaking, which is an important food safety issue. While this style of needle is designed for multiple use, it is important not to contaminate a bottle of vaccine or drug when using any needles in this manner – a dirty needle or one that has already been used to inject into an animal should never go in a drug bottle even if it contains antibiotics. Also, reusing a needle while batch processing sheep is different from reusing a needle some time later on; in the latter case, contamination may occur when the unit is being stored. A needle that has been used on a diseased animal should never be reused. Reusing a needle when the sheep is wet will increase the risk of abscesses.

Risk Assessment for Multiple Use of Needles under Common Conditions

Conditions	Pro					Con		
	Efficient, consistent treatments for all lambs	Efficient, consistent treatments for all sheep and lambs	Little time before marketing for negative impacts to development	Potential cost savings vs multi-dose syringe	Potential cost savings vs single-dose syringe	Potential for reuse of same needles for other sheep and lambs	Repeated insertion of a used needle into the drug bottle may contaminate its contents	Negative impacts have ample time to develop: abscesses, maedi visna, caseous lymphadenitis
Single-session, multiple use of needles for injections of market lambs, using a multi-dose injection syringe	✓		✓			✗		
Single-session, multiple use of needles for injections of market lambs, using a single-dose injection syringe			✓			✗	✗	
Single-session, multiple use of needles for injections of permanent flock members, using a multi-dose injection syringe		✓				✗		✗
Single-session, multiple use of needles for injections of permanent flock members, using a single-dose injection syringe				✓		✗	✗	✗
Single-session, multiple use of needles for injections of permanent flock members, using disposable needle/syringe					✓		✗	✗
Reuse of needles for single injection of individual sheep/lambs								✗
Reuse of disposable needles for single injection of individual sheep/lambs					✓			✗

3.3.9.2 Risks

1. Needles used for vaccination of all or part of your flock may be reused; it is later discovered that one member of your flock is suffering with a disease and may have infected the sheep that were vaccinated after her.
2. Reusable injection units used for treatment might be stored in an open area; bacteria that have settled on the unit could contaminate one of the sheep in treatment and an infection could result.
3. Reuse of a single-dose injection unit (and needle) could cause the contamination of medication when it is repeatedly reloaded; the contaminated medication can cause abscesses, and propagation of maedi visna or caseous lymphadenitis.
4. As sheep are usually considered a meat product, all improper injections, sites or techniques may affect meat quality and value.

3.3.9.3 Risk Management Practices

1. Ideally, needles are not reused.
2. A new needle should be used to withdraw medications from their bottles.
3. When reusing needles, producers should change needles frequently, before they are dulled or bent.
4. When needles are reused, their use should be limited to a group of sheep that are of identical or of similar disease risk.
5. A needle should not be left in the bottle when finished with a drug.
6. Multi-dose syringes should be disassembled, cleaned and disinfected, and stored in a clean, sterile place.
7. Sharps should be cleaned and disinfected after each use and stored in a clean, sterile place.

3.3.10 Strategy 10 – Manage Deadstock

Deadstock are removed immediately from livestock rearing areas and moved in a manner that limits cross-contamination with the flock. Placentas, aborted material and other tissue are managed as deadstock. The deadstock holding area is located away from the production area and is secured against dogs, cats and scavengers. Disposal respects local regulations and is done in a manner that limits disease exposure to the flock.

3.3.10.1 Description

Deadstock management includes addressing risks for removing deadstock from the production area, movement on the farm, storage on farm, and eventual disposition.

Deadstock are moved from the production area as soon as they are noticed, and are taken directly to a secure holding area. Movement to this holding area avoids contact with any sheep in the area surrounding the route. Disposal options are dictated by local regulations, where they exist, and disposal, if on-farm, should ensure that contact between disposed deadstock and the rest of the flock is avoided, either directly, or via pests, wildlife, guardian animals and/or dogs and cats.

3.3.10.2 Risks

1. Deadstock may not be discovered in a timely manner and might therefore be accessible by their flock-mates and by scavengers, wildlife, dogs, cats, etc., thus exposing some members of the flock directly or indirectly to a disease.
2. Disposal may not be secure from scavengers, wildlife, dogs, cats, etc., and other flock members are potentially indirectly exposed to a disease.

3.3.10.3 Risk Management Practices

1. Offal and other tissue should be treated in the same manner as deadstock.
2. Deadstock should be removed immediately from the production area and from contact with the flock and with guardian animals, wildlife, other predators, scavengers, dogs and cats.
3. Equipment used for removal should be dedicated for the purpose, and/or cleaned and disinfected between uses.
4. Disposal methods should adhere to local/provincial regulations.
5. Movement from the pens and other production areas should take the most direct path to the disposal area, and avoid pens and areas in which highly susceptible sheep are kept.
6. The deadstock holding area should be away from the production area and be secured from access by farm animals and predators.
7. If deadstock are to be disposed on-farm, contact with guardian animals, dogs and cats is minimized.
8. If deadstock are to be picked up by a disposal service, they are deposited in a secure holding unit or area away from the active production area.
9. Movement off-site, if contemplated, requires care in accessing the holding area, respecting farm zoning practices, and avoidance of contamination of farm areas upon exit.

3.4 Principle 4: People

Goal – Conduct a risk assessment and develop protocols for all visitors and farm personnel.

3.4.1 Strategy 1 – Conduct risk assessments for all people entering the farm

All people entering a farm are subject to a risk assessment.

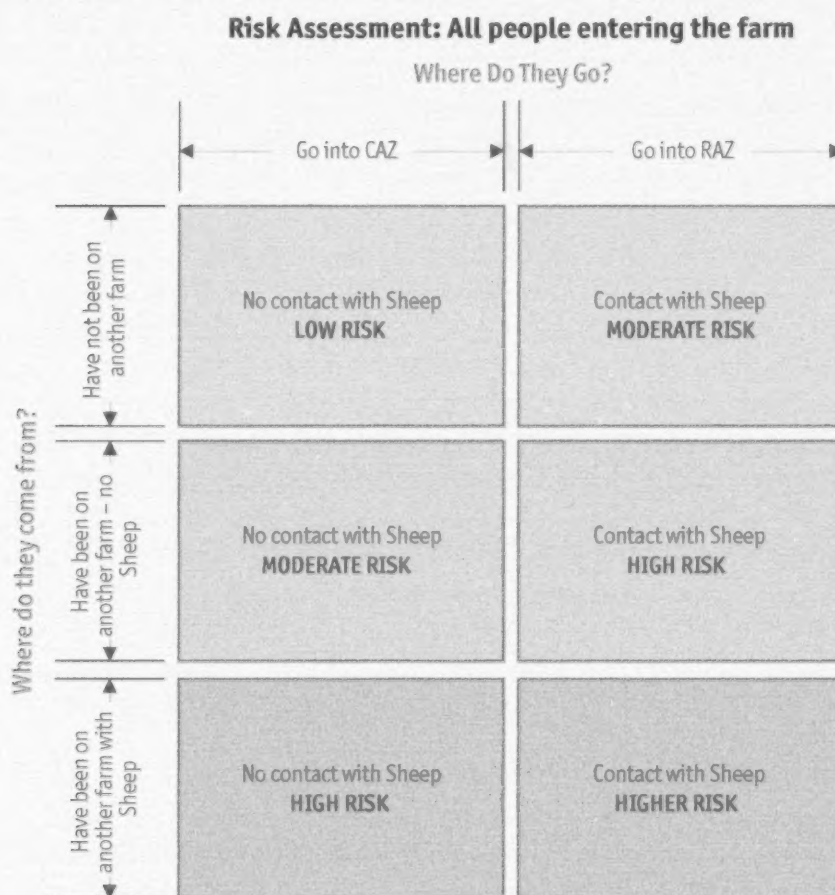
3.4.1.1 Description

Family and farm workers are most frequently and intensively present on the farm. It is imperative that they clearly know their roles and how to ensure that they do not play a role in transmitting disease on the farm. They also need to be aware of potential zoonotic risks when working with animals and their products. For these reasons, family and farm workers would be considered to operate within the highest risk level, based on the risk assessment approach recommended here. Because of their highly personal and professional involvement in the farm operations, family members and farm workers can also serve as sources of information about farm operations and farm biosecurity practices for service providers and other visitors.

Service providers and visitors also play an important role on your farm. Being able to manage their activities properly and determining what level of biosecurity practices need to be used during their time on your farm can be done objectively, based on a risk assessment model. Essentially, what service provider personnel and visitors might bring with them when they arrive and what they are here to do determine the risk they represent to your flock:

- Have they visited other farms before arriving at yours?
- Did they interact with sheep or other similarly susceptible species when there?
- Where do they need to go on your farm? and
- What is the extent of their interaction with your sheep while on your farm?

The diagram below illustrates how these factors can be used to determine the risk levels. For simplicity, risk levels can be described as low, moderate and high. On one dimension in the matrix, those who have been on a farm before arriving, and whether they have interacted directly with sheep or other livestock, contribute to the risk of their bringing infectious materials with them. On the second dimension, they are either entering the Controlled Access Zone (CAZ) and will follow the practices that are required at upon entry, or they are also entering the Restricted Access Zone (RAZ) with its more extensive biosecurity requirements.



In general, these risk groups could be described as follows:

- **Low Risk:** travel to a farm but do not come in direct contact with livestock; for example, financial advisors and equipment salespersons
- **Moderate Risk:** travel from farm to farm but do not directly contact the livestock; for example, feed delivery
- **High Risk:** neighboring producers or anyone who travels farm to farm and comes in direct contact with livestock and have been in contact with livestock from other farms; for example, vets, shearers, and hoof trimmers
- A **Higher Risk** classification can be considered for anyone who has been in contact with sheep on another farm (or elsewhere), in isolation area or near diseased animals. If access to another flock was required, specific risk-reduction steps would be taken.

These risk assessments can also be used in communicating the type of biosecurity practices that will be needed during their time on your farm.

3.4.1.2 Risks

1. Family members may not be familiar with the expression of zoonotic diseases in sheep and could become infected with these zoonoses.
2. Farm workers may not be familiar with the required biosecurity practices in some areas of the farm, and are needed to undertake some work in one of those areas.
3. Farm workers may not have a clear and logical way to explain your biosecurity requirements to service providers and visitors.
4. People may be unaware of or may not understand the risk they represent to the health of your flock and might not believe that following your biosecurity practices is necessary.
5. People may enter the CAZ or the RAZ either accidentally or on purpose and may not follow your required practices.

3.4.1.3 Risk Management Practices

1. Family members should be intensively trained in all of the biosecurity practices throughout the farm operations, including their extension to off-farm activities.
2. Farm workers should be intensively trained in all of the biosecurity practices throughout the farm operations.
3. A risk assessment should be performed on all types of service providers and visitors, using the approach described in the diagram above, and a record of the risk levels should be entered in a permanent record; a summary of the practices required to be followed by each should be included.
4. The risk assessment summary should be reviewed with your farm workers and they should be encouraged to relate it to service providers and visitors with whom they interact on your farm.
5. The risk assessment structure should be used to demonstrate to service providers and visitors the reasons for using your biosecurity protocols during pre-visit preparations and upon their arrival.

3.4.2 Strategy 2 – Develop and enforce risk management practices for all people visiting the farm, using the risk assessment outcomes

People working on, providing service to or visiting the farm are guided by risk management practices based on the risk assessment.

3.4.2.1 Description

Any person planning to enter your farm, especially someone who works in agriculture, may have been exposed to an animal disease, and may inadvertently carry pathogens on their bodies and/or clothing. In addition, the diseases people encounter in other countries or in other regions of Canada may not be prevalent in your region, and therefore your sheep will not have developed resistance naturally, and you may not be familiar with how to treat for them. Their visits may be of important financial and operational benefit to your farm, and so a way to have them safely carry out their visits needs to be available.

3.4.2.2 Risks

1. Visitors and service providers may harbour pathogens on their body or on their clothing and/or footwear.
2. Visitors and service providers may transport pathogens on their tools and equipment (cell phones, computers, notebooks, etc.).

3.4.2.3 Risk Management Practices

1. A full discussion of your biosecurity practices should be undertaken during planning for their visit and all intended visitors should understand and agree to your requirements; a risk assessment approach should be used as described in Strategy 1, above.
2. If you frequently have visitors to your farm, you should keep current about disease prevalence in your region, in other areas of Canada and in other countries.
3. For people who are identified to be of high risk, those who have been on a farm recently and who have contacted other animals that are or may be diseased, one or more of the following practices can be used:
 - Wait a minimum period of time before visiting your farm; CFIA currently recommends a period of 5 days for foreign visitors;
 - Shower and clean and disinfect clothing and tools/equipment they need to bring to your farm before their arrival; and
 - Accompany your visitor at all times during their visit and help them to carry out your required biosecurity practices.

3.4.3 Strategy 3 – Know what people are on your premises

Producers know who is on the farm, where they are, and what their purpose is.

3.4.3.1 Description

Several service providers and visitors might be on your farm on any given day. While the number may not be overwhelming, producers and farm workers are busy and may not always be available to greet them when they arrive and direct them throughout their time on the farm. It is important that all visits are known in advance so that proper biosecurity planning can be done, and unplanned visitors need to participate in a risk assessment and not be permitted to enter the farm before doing so.

3.4.3.2 Risks

1. Visitors might arrive at the farm and not be aware of your biosecurity requirements; they may proceed onto the property, into the production area and through the barn looking for someone with whom they would like to meet, and may not follow any of your required biosecurity practices. Their risk of transmitting pathogens to your farm or flock would not be known.
2. Service provider personnel might arrive at your farm without advance notice to perform a service and could proceed to their intended work area without proper cleaning and disinfection having been done.
3. People who are on your farm for one purpose might move into another control zone without your knowledge and without following required biosecurity practices.

3.4.3.3 Risk Management Practices

1. All farm visits should be planned in advance and be sanctioned; a risk assessment should be completed and you and the service provider or visitor should both understand and agree to the schedule and biosecurity requirements for the visit.
2. Visitors should report themselves to the producer or a farm employee upon arrival. A sign with contact information should be posted at the farm entrance to inform and remind visitors to do so.
3. All farm visitors should be met when they arrive, outside the CAZ, and should record their visit in your visitors' log; they should be instructed about the layout of your farm, where they are permitted to go, and what practices need to be applied in that location(s).
4. The producer and/or the appointed in-charge worker should be made aware of the arrival of all service providers and visitors.

3.4.4 Strategy 4 – Train farm workers and communicate with them about biosecurity; inform all visitors and service providers

All farm workers and family members are trained in the farm's biosecurity practices. The farm biosecurity protocol is communicated to visitors and service providers and they comply with it.

3.4.4.1 Description

Your family members and farm workers should know what is required of them in all circumstances when they are on the farm. They should understand both what to do and why it needs to be done, in order to fully commit to your practices. They should also be confident in explaining your biosecurity requirements to service providers and other visitors on the farm when necessary. Focused training in all of the requirements of your biosecurity plan will be needed when a new biosecurity plan is put in place, and when changes are made to its practices and methods. You need to be sure that they know what to do and can explain it to others.

3.4.4.2 Risks

1. Family members or farm workers may not be certain of the practices that are needed upon entry into or exit from the CAZ and RAZ and what is required in areas of specific risk, and by their actions may cause the infection of a highly susceptible animal or contaminate an area within the production area.
2. Family members and farm workers may not be able to explain your biosecurity practices to service providers and visitors on the farm, who proceed onto the farm without proper compliance with your practices.

3.4.4.3 Risk Management Practices

1. Regularly scheduled training sessions should be carried out with all family members and farm workers, both in one-on-one and groups sessions; you should confirm their knowledge and areas requiring additional training and explanation during each session and carry it out.
2. Training sessions should be scheduled and carried out whenever a practice is changed or a new practice is added to your biosecurity plan.
3. Family members and farm workers should be monitored during their activities and work on the farm; you should praise and reward good performance and address and correct any areas of incomplete knowledge and ability.

3.4.5 Strategy 5 – Recognize zoonotic risks

Family members, farm workers, visitors and service providers understand zoonotic diseases and take full precautions to protect themselves.

3.4.5.1 Description

Zoonotic diseases are those which can infect humans. Several diseases of sheep are zoonotic and producers, your family members, service providers and other visitors need to know that they exist and understand the risks they represent. These are in three categories: abortion agents, enteric disease and orf.

3.4.5.2 Risks

1. Your sheep may be infected with a zoonotic disease and family members and farm workers could come in contact with pathogens from direct contact with your sheep. Their exposure could come from helping with lambing and managing abortions, and/or from inhaling aerosol forms of the pathogens (dust, dried manure, vapour).
2. Service providers and visitors could be exposed to zoonotic pathogens directly by handling sheep in the course of their planned activities on your farm and also from aerosol sources.

3.4.5.3 Risk Management Practices

1. Advise all family members and farm workers when a zoonotic disease has been diagnosed in the flock.
2. Advanced biosecurity practices and added cleaning and disinfection should be in place whenever a suspected or confirmed case of a zoonotic disease is present on your farm.
3. In particular, additional hand washing and sanitizing should be practised throughout your farm, and pregnant and potentially-pregnant people should be excluded from the active farm area.
4. You should participate in disease surveillance and management programs to reduce the likelihood of occurrence of zoonotic diseases on your farm, and to reduce their impact if they are present.



4: Glossary

The terms in the following table following are used in the Guide and in the Standard.

Italicized terms in the text are defined in the glossary:

<i>Term</i>	<i>Definition as used in The Standard and The Guide</i>
Adjacent to (à proximité de)	This includes situations where sheep are in nose to nose contact with other animals including other sheep. This includes situations where the animals cannot touch each other but share airspace (e.g. sheep are not commingled with livestock (including sheep) but may have direct or indirect contact across a fence line or pen wall). It would not include those farms separated by a road or some other physical space barrier.
All-in-all-out (tout-plein tout-vidé)	A production system in which the whole flock (all-in-all-out) or groups of lambs/sheep of similar disease risk (modified all-in-all-out) are housed and moved as a single unit(s) and are removed from the farm as a unit.
Barn (Bergerie)	A farm building used for storing farm products and sheltering livestock.
Biosecurity (Biosécurité)	A health plan or measures designed to protect a population from infectious agents.
Biosecurity Protocols (Protocoles de biosécurité)	Those measures specific to a sheep operation used to prevent the introduction and the spread of disease within an animal population and from that sheep operation.
Canadian Sheep Identification Program (CSIP) (Programme canadien d'identification des moutons (PCIM))	The Canadian Sheep Identification Program (CSIP) is a mandatory, industry-led initiative to develop a traceback system that will lead to a full-scale traceability system and the capacity to address producer concerns about sheep health, provide valuable management feedback to producers, and meet consumer expectations for quality assurance and food safety (http://www.cansheep.ca/cms/en/Programs/CSIPPrograms_new/CSIP/CSIP.aspx)
Cleaning (Nettoyage)	Involves washing with detergent in order to remove all organic matter, and includes both a dry (scraping and brushing) and wet clean.
Commingling (Mélange d'animaux)	The act of mixing sheep, either with other sheep from different farms or production facilities or with other animal species, resulting in direct or close indirect contact among them.

Community pastures (<i>Pâturages communautaires</i>)	A community pasture is a public grazing area shared by more than one producer and not owned by a single producer.
Controlled Access Zone (<i>Zone d'accès contrôlé</i>)	A designated area in which biosecurity protocols are in place and monitored and within which livestock are managed (e.g. a location) and which is accessible to people / equipment / vehicles and livestock only through a securable (e.g. lockable) controlled access point.
Cross-contamination (<i>Contamination croisée</i>)	The distribution of potentially-infectious material from one animal to another, or between facilities, equipment or vehicles by animals, people or things (see also fomites).
Deadstock (<i>Carcasses</i>)	Dead sheep or other animals; with regard to risk, handling or disposal, the term is used in the Guide includes aborted fetuses and any birth by-products or other animal tissue.
Disease outbreak (<i>Flambées épidémiques</i>)	When the incidence of illness from disease rises quickly and often to a high level within a short period of time. Sometimes the disease was not previously present in the flock, and sometimes it is an increase in a disease already present.
Disinfecting; also Disinfection (<i>Désinfecter, désinfection</i>)	The use of a disinfection agent, i.e. a chemical that can kill pathogens, on areas being cleaned.
Emerging Disease (<i>Maladie émergente</i>)	A new infection resulting from the evolution or change of an existing pathogen or parasite resulting in a change of host range, vector, pathogenicity or strain; or the occurrence of a previously unrecognised infection or disease.
Endemic disease (<i>Maladie endémique</i>)	Continued presence of a disease in a specific population or area usually at the same level – often a low level. Also called enzootic disease.
Equipment (<i>Équipement</i>)	Used inclusively in the Guide to identify all tools and implements, skid-steers, tractors, tractor accessories, etc. used on the farm.
Ewe (<i>Brebis</i>)	A female sheep that is part of the breeding flock i.e. has been exposed to the ram for breeding purposes.
Farm Personnel (<i>Personnel de la ferme</i>)	Includes all full-time and part-time staff plus any family members who work at the operation.
Feedlot (<i>Parc d'engraissement</i>)	Feedlots are operations that purposely acquire lambs or cull adults from off-farm for the purpose of feeding but not breeding. All animals are sent to slaughter.

Fomites (Vecteurs passifs ou mécaniques)	Any physical entities on which infectious material can be transmitted. They would include animals, people, their footwear and clothing, any equipment and tools brought into or used within a zone, dogs and cats, pests and vermin, and vehicles. Animals that act as fomites are themselves not infected but act as a mechanical transfer of infectious material.
Foreign Animal Diseases – FADs (Maladies animales exotiques – MAE)	Diseases not present in Canada and listed by the CFIA as reportable (www.inspection.gc.ca)
Guardian animals and working animals (Gardiens d'animaux et animaux de travail)	Includes dogs (e.g. guardian dogs, herding dogs), llamas, donkeys, horses etc that have contact with and are used to manage the sheep for purposes such as moving the sheep, or guarding the sheep from predators.
Infectious diseases (Maladies infectieuses)	Diseases caused by an infectious disease agent e.g. parasite, bacterial, virus, fungus, prion.
Isolation (Isolement)	The action of restricting an animal to a location that is physically separate from other livestock. The purpose of isolating an animal is usually to prevent it from transmitting a disease to another animal, either because it is known to be diseased or because its disease status is currently unknown. It may also be to protect an animal from contacting disease from infected flock members. The location is known as an isolation facility.
Known health status (Statut de santé connu)	The information that should be made available about a flock or an individual animal when offered for sale or intended for commingling, including disease history and the results of any diagnostic testing; flock health management practices; vaccination program detail sufficient to determine compatibility with the home flock; and housing and movement detail sufficient to identify any potential recent disease exposure.
Lamb (Agneau)	A female (ewe) or male (ram or castrated) that is less than 12 months of age and is not part of the breeding flock.
Loading area (Aire de chargement)	An area that is designated for the loading and unloading of animals. This is not just the ramp but it also includes any holding area used for this purpose.
Location (Emplacement)	A single location is defined as a property used to manage sheep (or livestock) that is self-contained and not divided by land or public road-way (e.g. concession road, highway – but not private laneway or walking path).
Milking ewes (Brebis laitières)	These are ewes that are currently in production and are actually being milked for human consumption.
Nursing ewe (Brebis soignante)	A ewe that is lactating and currently being nursed by a lamb or lambs.

Organic material (Matière organique)	As used in the Standard, organic material is any substance that is derived from animal or vegetal matter.
Other livestock (Autre animaux d'élevage)	Domestic livestock animals, specifically goats, cattle (dairy, beef, veal), horses, bison, water buffalo, farmed deer / elk, alpacas, llamas, swine, poultry, turkeys, ducks, geese.
Pastures (Pâturages)	Fenced areas used for livestock grazing at any time of year. Can include multi-use fields (e.g. graze after haying or aftermath feeding).
Pathogen (Agents pathogènes)	A bacterium, virus, parasite, prion, fungus or other micro-organism that can cause disease.
Personal Protective Equipment (PPE) (Équipement de protection personnelle)	Gloves, clothing, footwear, head and face coverings, breathing apparatus and all cleansing agents, disinfectants and materials that limit, reduce or restrict contact by a pathogen to a human, by physical, airborne or any other means.
Pest (organismes nuisibles)	As used in the Guide, any insect, rodent or other small organism that can enter a sheep facility.
Practice (Pratique)	A repeatable method of carrying out a task or activity for a specific end result, including the use of equipment and products.
Protocol (Protocole)	This includes any formal process that a producer used to define how they manage their operations on a day to day basis. The protocol may be formally documented but it may also be non-documented process that is strictly followed. The intent is to focus on the process rather than the documentation.
Ram (Bélier)	A male sheep of any age that is intact and has been or is being used for breeding purposes.
Reportable disease (Maladie à déclaration obligatoire)	Reportable diseases are defined under regulations enforced by CFIA. In cases of a suspected or confirmed case of a reportable disease outbreak, and in most cases of a FAD, zoonotic or emerging disease, CFIA is responsible for ensuring that required procedures are followed. A list of reportable diseases is available on the CFIA website at http://www.inspection.gc.ca/animals/terrestrial-animals/diseases/reportable/2012/eng/1329499145620/1329499272021
Restricted Access Zone (Zone d'accès restreint)	An area inside the Controlled Access Zone where sheep are housed and where access by people or equipment is further restricted.
Sheep (Mouton)	A ewe, ram, castrated ram, or lamb.

Sheep operation <i>(Ferme de moutons)</i>	The buildings, dry lots / paddocks / corrals, and pastures used at any time of the year to manage sheep; includes any structures that are used in managing the sheep operation that don't have sheep, e.g. equipment shed, handling shed or pen, records room, clothing storage area, manure storage, feed storage. The sheep operation may have one or more than one location. It includes guardian or working animals (e.g. dogs, donkeys, llamas) and equipment (e.g. handling facilities, ATV etc) used to manage the sheep.
Vector <i>(Vecteur)</i>	Anything, including an organism such as an arthropod (e.g. a tick, mosquito, fly, flea, or mite), that does not cause disease itself but that transmits a pathogen by conveying pathogens from one host to another.
Visitors <i>(Visiteurs)</i>	Any non-personnel that come to the operation.
Zoonotic disease <i>(Maladie zoonotique)</i>	An infectious disease that can be transmitted directly or indirectly (e.g. by a vector) from non-human animals, both wild and domestic, to humans or from humans to non-human animals.



5: Acknowledgements

Sheep Biosecurity Advisory Committee (SBAC)

The National Sheep Producer Biosecurity Planning Guide is a collaborative effort between the CFIA's Office of Animal Biosecurity (OAB) and the Canadian Sheep Federation (CSF), together with an Advisory Committee comprised of industry leaders, government representatives, sheep veterinary practitioners, and academics who were selected specifically for this assignment. Funding for the project was provided by Agriculture Agri-Food Canada through the Growing Forward framework.

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Appendices

Appendix 1: Allied Programs and Resources

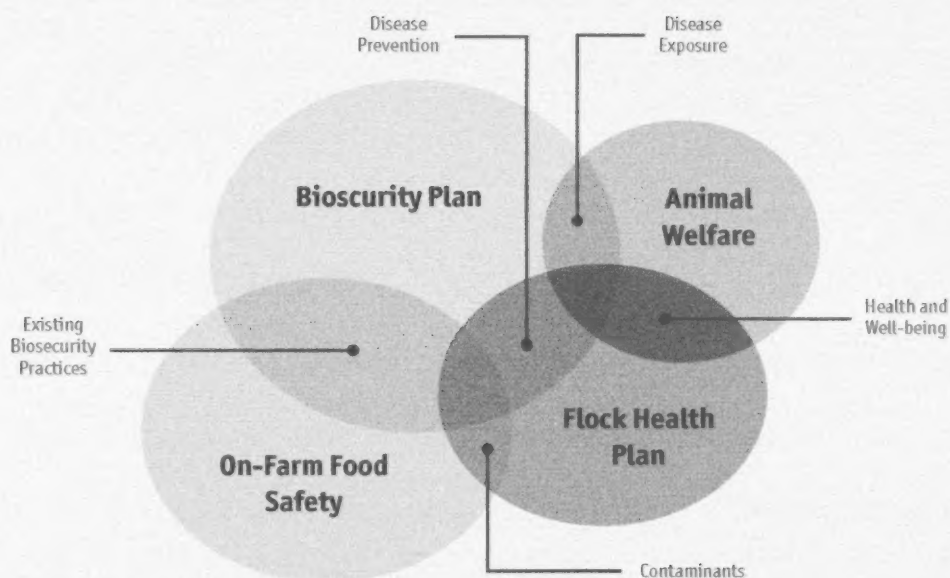
When thinking about biosecurity plans for your farm, you will have the opportunity to refer to a number of complementary programs, for example:

1. The Food Safe Farm Practices Program is supported by the Canadian Sheep Federation (CSF), and details are available from CSF;
2. Flock health plans, that may be developed for each farm in consultation with a flock veterinarian; CSF also has a suite of flock health materials, including
 - o Promotion of disease prevention programs
 - o Encouragement to develop veterinary-client relationships
 - o Education for the industry on optimum health management practices and disease control options

Information is available on these programs from the CSF website and from:

- o Western Canadian Flock Health Program
 - o Ontario Sheep Health Program
 - o Scrapie Canada
3. Animal Welfare concerns and requirements, both in production and in transport;
 4. Environmental farm plans, especially with respect to land use, manure management and water; and
 5. Traceability programs, in particular the Canadian Sheep Identification Program; information is available from CSF

It makes sense for you to consider these concerns together while developing your farm's biosecurity plan, since there are links between them. The diagram below illustrates the relationships among several of the on-farm programs and common areas of concern.



On-Farm Program Links

In addition to those illustrated, management of manure from the sheep operation and deadstock management on-farm as covered in your Environmental Farm Plan will have some activities in common with the biosecurity plan, such as how they are disposed of and their potential role in transmission of diseases. In fact, all of the practices that are designed to achieve the goals of the individual plans are ultimately Good Production Practices themselves. Traceability methods will be used to identify your sheep and their movement from place to place, allowing linkage to all of these programs. Consistency among the practices in these programs should be part of your biosecurity planning.

Appendix 2: Government and Industry Resources for the Sheep Sector

One of the best sources of information for biosecurity and any other animal health related information is your flock veterinarian. It is understood that in some areas of the country, a flock veterinarian with expertise in sheep medicine may not be available locally. To assist you with locating a veterinarian for your flock, the veterinary medical association for each province is provided below and each association has a database of veterinarians and veterinary clinics for that province.

1. College of Veterinarians of British Columbia: www.cvbc.ca
2. Alberta Veterinary Medical Association: www.abvma.ca
3. Saskatchewan Veterinary Medical Association: www.svma.sk.ca
4. Manitoba Veterinary Medical Association: www.mvma.ca
5. College of Veterinarians of Ontario: www.cvo.org
6. Ordre des médecins vétérinaires du Québec : www.omvq.qc.ca
7. New Brunswick Veterinary Medical Association: www.nbvma-amvnb.ca
8. Nova Scotia Veterinary Medical Association: www.nsvma.ca
9. Prince Edward Island Veterinary Medical Association: www.peivma.com
10. Newfoundland and Labrador Veterinary Medical Association: www.nalvma.com

Other resources are also available that can either provide you with the needed information or can help direct you to the most appropriate contact.

For additional information on biosecurity, diseases of sheep and animal health regulations, the Canadian Food Inspection Agency of the Government of Canada is a valuable resource. Please visit www.inspection.gc.ca.

Many provincial governments have supplementary resources on sheep flock management and biosecurity. There may also be veterinary extension specialists available for your flock veterinarian to contact and gather additional information.

1. British Columbia Ministry of Agriculture: www.gov.bc.ca/agri/
2. Alberta Ministry of Agriculture and Rural Development: www.agric.gov.ab.ca
3. Saskatchewan Ministry of Agriculture: www.agriculture.gov.sk.ca
4. Manitoba Department of Agriculture, Food and Rural Initiatives: www.gov.mb.ca/agriculture/index.html
5. Ontario Ministry of Agriculture, Food and Rural Affairs: www.omafra.gov.on.ca
6. Le Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec : www.mapaq.gouv.qc.ca
7. New Brunswick Department of Agriculture, Aquaculture and Fisheries: www.gnb.ca/0027/Agr/index-e.asp
8. Nova Scotia Department of Agriculture: www.gov.ns.ca/agri/
9. Prince Edward Island Department of Agriculture and Forestry: www.gov.pe.ca/af
10. Newfoundland & Labrador Department of Natural Resources: www.nr.gov.nl.ca/nr

For current information on the sheep industry in Canada including information on a number of sheep industry associations, visit the Canadian Sheep Federation at www.cansheep.ca/

Additional sources for information on developing and implementing biosecurity plans may be found at the following sources.

1. Ontario Livestock and Poultry Council: www.ontlpc.ca
2. Agbiosecurity: www.agbiosecurity.ca

Appendix 3: Sheep Literature Search Results

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